

# **Introductory Geoscience Enrollment in the United States**

**Academic Year 2003-2004**



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## **Summary**

The American Geological Institute conducted a baseline survey of geoscience departments in the United States about the levels of enrollment in various categories of introductory geoscience courses. The survey resulted in an actual census of 137,180 students in 241 reporting departments. When a simple linear estimation is made from the responding sample, the likely maximum whole enrollment in introductory geoscience courses is approximately 385,000 students. Relating this to enrollments in all degree-granting institutions, this represents 2.3% of the total enrolled higher education population in the 2003-2004 academic year. Bachelor-focused departments teach the majority of the students in introductory geoscience courses, but Ph.D.-granting departments carry a higher per department load. Community colleges represent approximately 10% of the teaching of introductory geoscience, a structural concern for the discipline with the growing reliance on community colleges providing introductory instruction for higher education. Additionally, analysis of the relationship between the number of students in introductory courses to the number of majors in a department show no significant relationship, complicating the assertion that introductory courses are the major recruitment tool for the geosciences.

## **Introduction**

Introductory geoscience courses is one of the major points of public contact for the geosciences and is often anecdotally cited an important source of majors. Persistent concerns about enrollments of geoscience majors and the level of effort to attract those majors is a cause for concern.

In an effort to build a baseline assessment of the state of introductory geoscience in the United States, the American Geological Institute undertook a survey of enrollment levels in three different “classes” of introductory courses for the 2003-2004 academic year. This retrospective survey was conducted between October 2004 and February 2005, and was sent to 676 identified active geoscience departments offering courses and/or degrees at the undergraduate level. Of this survey, 241 departments completed the survey with 231 reporting some level of introductory geoscience enrollments, representing a 36% response rate.

The survey asked for the number of students enrolled during the 2003-2004 academic year in courses in their department that qualified as one of the following three categories, but not limited to the specific titles:

- Physical Geology/Geography, Introductory Oceanography, Meteorology, and/or Space Science
- Environmental Geology/Geography
- Geology of National Parks/Public Lands

These categories were chosen as they represent the major subject lines for textbook publishers and are a first approximation of the breadth of introductory courses in the geosciences.

The American Geological Institute has estimates from textbook publishers of the number of units sold each year in these categories: 275,000 introductory physical geoscience textbooks, 50,000 environmental geoscience textbooks, and 12,000 books on National Parks and public lands. Given that the publishers have a good measure of textbook consumption, these numbers have been considered reasonably accurate. However, they do not provide any insight into the dynamics of the introductory course offerings in the geosciences.

## Total Populations

In response to the 2003-2004 Introductory Geoscience Course Survey, 241 departments of 676 departments responded. 231 of these departments reported some level of introductory enrollment for a total of 137,180 students during the academic year. When a simple linear estimate is made of the whole population from the survey responses, the total projected introductory geoscience enrollments is approximately 385,000. This estimate is likely the upper bound of the population as the non-responding departments will probably have a higher rate of no enrollments with the expected bias towards non-response for departments without introductory courses. The estimated whole enrollment in Physical Geology, etc. is a 13% premium over the textbook publisher reports of 275,000 units for that category. Such a premium is not unexpected with used book sales and the use of “niche” and self-published materials. Table 1 shows the reported and estimated whole enrollments for the academic year by course area.

**Table 1. Raw and Estimated Introductory Geoscience Course Enrollments, 2003-2004**

Course Area	Reported Enrollments	Estimated Total
Physical Geology, etc.	111,021	312,000
Environmental Geoscience	22,568	63,000
National Parks/Public Lands	3,591	10,000

Table 2 shows the responses categorized by the nature of the program, including Ph.D.-granting departments, non-community college programs that do not grant Ph.D.’s, and community college departments.

**Table 2. Reported Enrollments by Subject and Department Profile, 2003-2004**

	Physical Geology, etc.	Environmental Geoscience	National Parks/Public Lands	Total Departments
Ph.D. Granting	43,167	8,218	2,353	62
Non-Ph.D. Granting	55,618	13,791	1,114	135
Community Colleges	12,236	559	124	30

Another question is the dynamics of departmental-level enrollment by subject area. Table 3 lists the number of departments offering courses in a subject area, the average, maximum, and minimum enrollments in a department for the 2003-2004 academic year.

**Table 3. Reported Average, Maximum, and Minimum Enrollments, but Subject, 2003-2004**

	Physical Geology, etc.	Environmental Science	National Parks/Public Lands
Departments Offering	227	151	52
Average Enrollment	504	152	70
Largest Enrollment	3,641	3,160	621
Smallest Enrollment	1	7	4

## Where are the Students Taught?

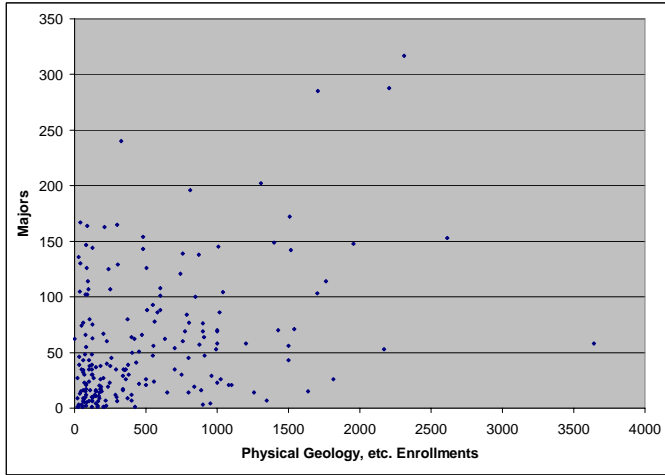
One important question is which institutional category provides the maximum exposure of the geosciences to the college-enrolled population. The non-Ph.D. granting departments teach the majority of the students in all areas except for National Parks and Public Lands. However, Ph.D.-granting departments carry a larger per department load in introductory enrollments in the geosciences, and represent the largest sector for providing course contacts on the subject of National Parks and Public Lands. Of particular note is that community colleges represent a small fraction of the contacts in the introductory geoscience enrollments, and particularly the non-physical geoscience courses. This alignment is potentially caused by the multi-disciplinary mission of the science programs in most community colleges, and that over half of geoscience program closures and mergers since 1999 have occurred at the community college level.

**Table 4. Carrying Load of Introductory Courses by Department and Course, 2003-2004**

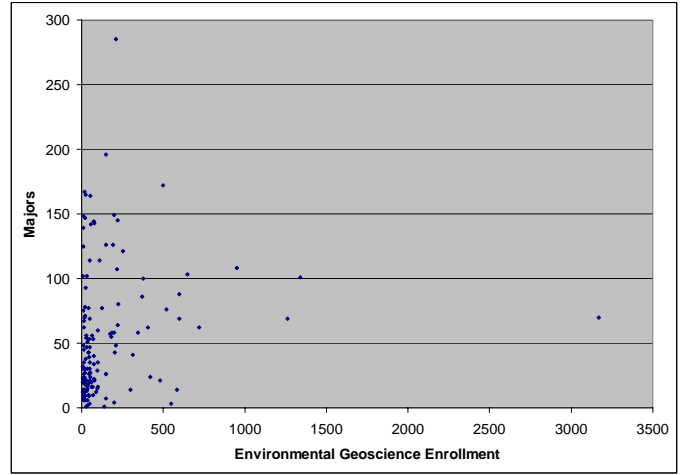
Dept. Type	% of Depts	Percent of Total Enrollment in Category			
		Total Introductory Geoscience	Physical Geology, etc.	Environmental Geoscience	National Parks/ Public Lands
Ph.D. granting	27	39	39	36	66
Non Ph.D. granting	60	51	50	61	31
Community College	13	10	11	3	3

## Introductory Geoscience as a Major Recruitment Tool

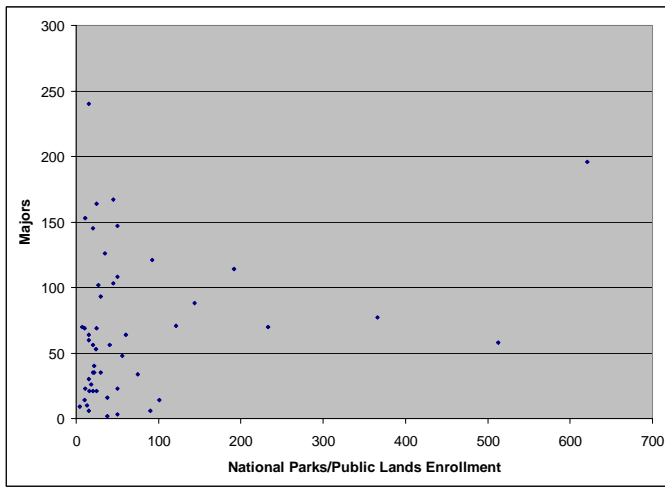
One final metric analyzed from the data in this survey was the relationship between the total enrollments in the introductory courses and the number of majors in the program. Figures 1-3 show scatterplots relating the number of majors to the total enrollments in Physical Geology, etc., Environmental Geoscience, and National Parks and Public Lands. Based on simple regression analysis, there does not appear to be a significant relationship between the number of introductory students enrolled and the number of majors in a department (Physical Geology, etc.  $r^2=0.03$ ; Environmental Geoscience  $r^2=0.001$ ; National Parks/Public Lands  $r^2=0.06$ ). This may allude to a disconnect between the missions of the introductory programs and the departmental major recruitment efforts, or an inefficacy of the introductory geoscience courses as a majors recruitment tool.



**Figure 1. Physical Geology Enrollments vs. Majors**



**Figure 2. Environmental Geoscience Enrollment vs. Majors**



**Figure 3. Parks/Public Lands Enrollment vs. Majors**

# Responding Departments

Adams State College Dept of Geology & Environmental Science	Clatsop Community College Dept of Geology
Adirondack Community College Science Division	Colby College Dept of Geology
Adrian College Dept of Earth Sciences	College of Santa Fe Dept of Sciences and Conservation Studies
Alabama A&M University Dept of Plant & Soil Science	College of Southern Idaho Dept of Physical Science
Albion College Dept of Geological Sciences	College of Staten Island Engineering Science & Physics
Arizona Western College Dept of Geology	College of the Siskiyous Div of Natural & Applied Sciences
Arkansas Tech University Dept of Physical Sciences-Geology	College of William & Mary Dept of Geology
Ashland University Dept of Chemistry/Geology	Colorado College Geology Dept
Auburn University Dept of Geology & Geography	Colorado School of Mines Dept of Geology & Geological Engineering
Beloit College R.D. Salisbury Dept of Geology	Colorado State University Dept of Geosciences
Black Hawk College Dept of Natural Science & Engineering	Columbia University Dept of Earth & Environmental Sciences
Boston College Dept of Geology & Geophysics	Columbus State University Dept of Chemistry & Geology
Bowling Green State University Dept of Geology	Concord University Dept of Geology & Physical Sciences
Brevard College Geology Program	Cornell College Dept of Geology
Brigham Young University, Idaho Department of Geology	Delta College Dept of Geology
Broome Community College Dept of Engineering Science/Physics/Physical Sciences	DePauw University Dept of Geosciences
Broward Community College, Central Campus Dept of Natural Sciences (Oceanography & Geology)	Eastern Illinois University Dept of Geology/Geography
California State Polytechnic University, Pomona Dept of Geological Sciences	Eastern Oregon University Science Dept
California State University, Chico Dept of Geological and Environmental Sciences	Eastern Washington University Dept of Geology
California State University, Dominguez Hills Dept of Earth Sciences	Edison Community College Div of Health & Sciences
California State University, Fresno Dept of Earth & Environmental Sciences	Elizabeth City State University Dept of Geological, Environmental & Marine Sciences
California State University, Hayward Dept of Geological Sciences	Emporia State University Earth Science Dept
California State University, Long Beach Dept of Geological Sciences	Fairleigh Dickinson University Dept of Chemistry & Geology
California State University, Northridge Dept of Geological Sciences	Florida Atlantic University Dept of Geography & Geology
California State University, Stanislaus Dept of Geology	Florida State University Dept of Meteorology
Castleton State College Dept of Natural Sciences (Geology)	Fort Lewis College Geosciences Dept
Centenary College of Louisiana Dept of Geography & Geology	Franklin & Marshall College Dept of Earth & Environment
Central Arizona College Science/Mathematics Div	Fresno City College Earth/Physical Science Dept
Central Methodist University Division of Science	Furman University Dept of Earth & Environmental Sciences
Cerritos College Dept of Earth Science	Georgia Perimeter College Geology Dept, Dunwoody Campus
Chadron State College Dept of Earth Science	Georgia Southern University Dept of Geology and Geography
Chaffey College Geology Dept	Glenville State College Div of Science & Mathematics
	Hampton University Center for Marine & Coastal Environmental Studies

Hardin-Simmons University  
     Dept of Geological Sciences & Environmental Management  
 Hope College  
     Dept of Geological & Environmental Sciences  
 Humboldt State University  
     Dept of Geology  
 Hunter College (CUNY)  
     Dept of Geography  
 Illinois State University  
     Dept of Geography-Geology  
 Illinois Valley Community College  
     Dept of Geology  
 Indiana University/Purdue University, Fort Wayne  
     Dept of Geosciences  
 Indiana University, Bloomington  
     Dept of Geological Sciences  
 Iowa State University of Science & Technology  
     Dept of Geological & Atmospheric Sciences  
 Jackson Community College  
     Dept of Geology & Geography  
 Jacksonville University  
     Dept of Biology & Marine Science  
 Keene State College  
     Dept of Geology  
 Lafayette College  
     Dept of Geology & Environmental Geosciences  
 Lawrence University  
     Dept of Geology  
 Lewis-Clark State College  
     Dept of Earth Sciences  
 Long Island University, C.W. Post Campus  
     Dept of Earth & Environmental Sciences  
 Louisiana State University  
     Dept of Oceanography & Coastal Sciences  
 Louisiana Tech University  
     Geosciences Program  
 Macomb Community College, South Campus  
     Dept of Science (Geology)  
 Mansfield University  
     Dept of Geography & Geology  
 Mary Washington College  
     Dept of Geography  
 Massachusetts Institute of Technology  
     Dept of Earth, Atmospheric, & Planetary Sciences  
 Miami University  
     Dept of Geology  
 Michigan State University  
     Dept of Geological Sciences  
 Millsaps College  
     Dept of Geology  
 Montana State University, Billings  
     Dept of Biological & Physical Sciences  
 Montana Tech of the University of Montana  
     Geophysical Engineering Program  
 Montclair State University  
     Dept of Earth & Environmental Studies  
 Montgomery College  
     Dept of Physics, Engineering & Geosciences  
 Moravian College  
     Dept of Physics & Earth Science  
 Mount Union College  
     Dept of Geology  
 Murray State University  
     Dept of Geosciences  
 Muskegon Community College  
     Dept of Mathematics & Physical Sciences  
 Napa Valley College  
     Dept of Earth & Environmental Sciences  
 New Mexico Institute of Mining and Technology  
     Dept of Earth & Environmental Science  
 Nichols College  
     Dept of Environmental Science  
 North Dakota State University  
     Dept of Geosciences  
 Northeastern Oklahoma A&M College  
     Dept of Physical Science  
 Northeastern State University  
     Dept of Geology  
 Northeastern University  
     Dept. of Earth and Environmental Sciences  
 Northern Arizona University  
     Department of Geography, Planning, and Recreation  
 Northern Illinois University  
     Dept of Geology and Environmental Geosciences  
 Northland College  
     Dept of Geoscience  
 Nova Southeastern University  
     Inst of Marine & Coastal Studies  
 Oberlin College  
     Dept of Geology  
 Odessa College  
     Dept of Geology, Anthropology & Geography  
 Ohio State University, Lima  
     Dept of Geological Sciences  
 Ohio Wesleyan University  
     Dept of Geology & Geography  
 Olivet Nazarene University  
     Dept of Geological Sciences  
 Pacific Lutheran University  
     Dept of Geosciences  
 Palomar College  
     Dept of Earth Sciences  
 Pennsylvania State University, Monaca  
     Dept of Geosciences  
 Pomona College  
     Geology Dept  
 Portland State University  
     Dept of Geology  
 Principia College  
     Dept of Geology  
 Radford University  
     Dept of Geology  
 Rensselaer Polytechnic Institute  
     Dept of Earth & Environmental Sciences  
 Rhodes College  
     Geology Dept  
 Saint Lawrence University  
     Dept of Geology  
 Saint Louis University  
     Dept of Earth & Atmospheric Sciences  
 Saint Norbert College  
     Geology Dept  
 Saint Petersburg Junior College  
     Dept of Natural Science  
 Saint Petersburg Junior College, Clearwater  
     Dept of Natural Sciences  
 Sam Houston State University  
     Geology Program  
 San Diego State University  
     Dept of Geological Sciences  
 San Jose State University  
     Dept of Geology  
 Seattle Central Community College  
     Div of Science & Mathematics  
 Shawnee State University  
     Dept of Natural Sciences  
 Skidmore College  
     Dept of Geosciences  
 Slippery Rock University  
     Dept of Geography, Geology, and the Environment

Sonoma State University  
     Dept of Geology  
 South Dakota School of Mines & Technology  
     Dept of Geology & Geological Engineering  
 Southern Arkansas University  
     Dept of Physical Sciences (Geology)  
 Southern Connecticut State University  
     Dept of Earth Sciences  
 Southern Oregon University  
     Dept of Geology  
 Southern Utah University  
     Div of Geosciences and Physics  
 State University of West Georgia  
     Dept of Geosciences  
 SUNY, Brockport  
     Dept of the Earth Sciences  
 SUNY, Buffalo  
     Dept of Geology  
 SUNY, Fredonia  
     Dept of Geosciences  
 SUNY, Geneseo  
     Dept of Geological Sciences  
 SUNY, Oswego  
     Dept of Earth Sciences  
 SUNY, Potsdam  
     Dept of Geology  
 Susquehanna University  
     Dept of Geological & Environmental Science  
 Tennessee Technological University  
     Dept of Earth Sciences  
 Texas A&M University  
     Dept of Geography  
     Dept of Geology & Geophysics  
 Texas Christian University  
     Dept of Geology  
 The College of Wooster  
     Dept of Geology  
 Towson University  
     Dept of Physics, Astronomy & Geosciences  
 Tufts University  
     Dept of Geology  
 Tulane University  
     Dept of Earth and Environmental Sciences  
 Ulster County Community College  
     Math & Physical Sciences - Geology & Geography  
 Union College  
     Geology Dept  
 Union County College  
     Dept of Biology  
 United States Naval Academy  
     Dept of Oceanography  
 University of Alabama  
     Dept of Geological Sciences  
 University of Arizona  
     Dept of Geosciences  
 University of California, Davis  
     Dept of Geology  
 University of California, San Diego  
     Scripps Institution of Oceanography  
 University of Cincinnati  
     Dept of Geology  
 University of Delaware  
     Oceanography Program  
 University of Georgia  
     Dept of Geology  
 University of Hawai'i, Manoa  
     Dept of Geology & Geophysics  
 University of Houston Downtown  
     Dept of Natural Sciences  
 University of Illinois, Urbana-Champaign  
     Dept of Geology  
 University of Iowa  
     Dept of Geoscience  
 University of Kansas  
     Dept of Geology  
 University of Kentucky  
     Dept of Geological Sciences  
 University of Louisiana, Lafayette  
     Dept of Geology  
 University of Louisville  
     Dept of Geography & Geosciences  
 University of Maryland  
     Marine-Estuarine-Environmental Sciences Graduate Prog.  
 University of Massachusetts  
     Dept of Geosciences  
 University of Massachusetts/Lowell  
     Dept of Environmental, Earth, & Atmospheric Sciences  
 University of Michigan  
     Dept of Geological Sciences  
 University of Michigan, Dearborn  
     Dept of Natural Sciences  
 University of Minnesota, Duluth  
     Dept of Geological Sciences  
 University of Missouri, Columbia  
     Dept of Soil, Environmental & Atmospheric Sciences  
     Dept of Geological Sciences  
 University of Missouri, Rolla  
     Dept of Geology & Geophysics  
     Dept of Geological Sciences & Engineering  
 University of Montana  
     Dept of Geology  
 University of Montana, Western  
     Dept of Environmental Sciences  
 University of Montevallo  
     Dept of Geology  
 University of Nebraska, Kearney  
     Dept of Geography & Earth Science  
 University of New Hampshire  
     Dept of Earth Sciences  
 University of New Mexico  
     Dept of Earth & Planetary Sciences  
 University of North Carolina, Chapel Hill  
     Dept of Geological Sciences  
 University of North Carolina, Charlotte  
     Dept of Geography & Earth Sciences  
 University of North Carolina, Wilmington  
     Dept of Earth Sciences  
 University of Northern Colorado  
     Dept of Earth Sciences  
 University of Northern Iowa  
     Dept of Earth Science  
 University of Pittsburgh  
     Dept of Geology & Planetary Science  
 University of South Alabama  
     Dept of Earth Sciences  
 University of South Carolina  
     Dept of Geological Sciences  
 University of South Dakota  
     Dept of Earth Sciences & Physics  
 University of Southern Indiana  
     Dept of Geology  
 University of Southern Maine  
     Dept of Geosciences  
 University of Southern Mississippi  
     Dept of Marine Science  
 University of Tennessee, Chattanooga  
     Dept. of Physics, Geology, and Astronomy  
 University of Tennessee, Knoxville  
     Dept of Earth & Planetary Sciences



University of Texas, Dallas  
Dept of Geosciences

University of Texas, El Paso  
Dept of Geological Sciences

University of Texas, Permian Basin  
Dept of Geology

University of the Pacific  
Dept of Geosciences

University of the South  
Dept of Forestry & Geology

University of Tulsa  
Dept of Geosciences

University of Utah  
Dept of Geology & Geophysics

University of Virginia College, Wise  
Dept of Natural Science

University of Washington  
School of Oceanography  
Dept of Earth & Space Sciences

University of West Florida  
Dept of Environmental Studies

University of Wisconsin, Eau Claire  
Dept of Geology

University of Wisconsin, Madison  
Dept of Geology & Geophysics

University of Wisconsin, River Falls  
Dept of Plant & Earth Science

Virginia Polytechnic Institute & State University  
Dept of Geosciences

Washington State University  
Dept of Geology  
Program in Environmental Sci. & Regional Planning

Washington University  
Dept of Earth & Planetary Sciences

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Geology Dept

Weber State University  
Dept of Geosciences

West Chester University  
Dept of Geology & Astronomy

Western Illinois University  
Dept of Geology

Western Kentucky University  
Dept of Geography & Geology

Western New Mexico University  
Dept of Natural Sciences

Western State College of Colorado  
Dept of Geology

Western Washington University  
Dept of Geology

Wheaton College  
Dept of Geology & Environmental Science

Whitman College  
Dept of Geology

Wichita State University  
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Williams College  
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Worcester State College  
Dept of Natural & Earth Sciences

Yavapai College  
Geology Dept.