

An Assessment
of
**Geoscience Master's Degree Programs
in the United States**

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Executive Summary

Of the 369 geoscience departments that offer a master's degree, 122 (33.1%) responded to the survey. By size and geographic distribution, these responding programs fairly represent those institutions that offer a geoscience master's degree.

Current enrollments and master's degrees granted (for 2003) are above the previous year's levels, but projections for 2004 are below 2002 levels. Foreign-student (14.3%) and ethnic-minority student (3.9%) participation levels are quite low, while female participation (46.7%) is relatively high.

The major sources of financial support are teaching assistantships (34.4%) and research assistantships (29.1%), followed by personal resources (23.4%).

The clear majority (73.7%) of programs are research-oriented, requiring a thesis or research project. Another 18.6% said they were business/industry oriented. Only about 7% consider their programs as preliminary to a PhD. More than a third of the departments offer a combination of traditional geoscience and multidisciplinary curricula. Traditional geoscience was the next most common curriculum type offered. More than three-quarters of the responding programs indicated that they offer a flexible schedule of classes to their students.

Not unexpectedly, geoscience master's students come primarily from undergraduate geoscience programs (69.6%). More than a quarter come from other sciences—including biology, ecology, chemistry, mathematics, physics—and engineering. Only a few (4.4%) come from non-science backgrounds, such as geography, economics, and business.

The top recruitment method cited by departments was their website (35.4%), followed by print advertising (20.8%), and on-campus recruitment (18.1%). The perceived reasons for student attraction to a department's programs are the reputation of the department and its faculty (30.2%), followed by the program curriculum and content (23.4%), and career opportunities (21.5%).

While nearly all departments (87.3%) were interested in attracting more master's students, 35.8% indicated that they were not interested in developing a "professional" master's program. Only 19 (15.6%) of the responding programs were started in 1990 or later. Reasons for establishing the programs included student demand, to meet industry/government needs, to address societal needs, to attract students, and to develop a better department. Slightly more than half of the responding departments had set up no internal or external ties to serve the program, and exactly half said their programs had not been revised since they were founded. Of those programs that had been revised, 39.4% were revised within the last year, 27.3% were revised within the past two years, and 24.2% were revised more than 2 years ago.

Slightly more than half (55.7%) indicated the existence of an external advisory group for their programs. For those with such an external group, about half (51.4%) were national in composition, followed by those that were regionally based (37.8%).

One-third of the responding departments reported no available placement services for its graduates. Where such services are available, two-thirds are offered through the university, while one-third are through the department.

In reporting how their graduates were placed into jobs, departments indicated that the primary method by far was through faculty contacts (29.9%), followed by private contacts (16.3%) and word of mouth (15.7%).

For master's graduates, the most common destination for 46.5% was industry—other (i.e., non-research). The second most cited destination was going into a PhD program (28.3%).

Most satisfying to students were quality of faculty, quality of education, quality of facilities, and quality of the curriculum/program. Least satisfying to students were the time needed to complete degree/program, the frequent lack of employment opportunities, and the lack of financial support and resources.

Most satisfying to faculty were quality of students, quality of curriculum/program, and quality of employment placements. Faculty dissatisfaction focused on the amount of additional and uncompensated time required to supervise, mentor, and advise students, the heavy teaching load, and the lack of financial support for facilities, and for research and teaching assistantships.

Desired improvements included new programs and course offerings, more financial support for faculty, students, and facilities, and recruiting higher-quality students.

Geoscience Master's Degree Programs in the United States

Overview

For nearly all geoscience employment sectors, exclusive of those that are academic and research oriented (college and university teaching, national laboratories, federal and industrial research) the master's degree is the preferred degree credential for new hires. Given this new-hire degree preference by employers, AGI conducted a survey to examine geoscience master's-degree programs in the United States to provide departments and students with a greater awareness of the degree's significance. The survey was designed to distinguish master's programs that are formally "terminal" (stand alone or running parallel to other degree programs) from those that are a stepping stone to a PhD.

The survey comprised seven parts:

- A. **Department Information** (contact information, number of full-time faculty, degrees offered);
- B. **Student Demographics** (graduates and enrollments, percentages of non-U.S. students, females, ethnic-minorities, students returning after 5 years, and sources of financial support);
- C. **Master's Program Information** (orientation and type of program, details of courses and degree requirements, sources of students, recruitment methods, and reasons program is attractive)
- D. **Program History** (date started and reasons for program, external and internal ties, date of latest program revision);
- E. **Program Specifics** (source of funding, presence of and details about an external advisory group, program relations with other departments);
- F. **Student/Program Outcomes** (type of placement services available, methods used by program graduates to find employment, starting salary, where program graduates are employed by type of employer and geographic location);
- G. **Impressions** (aspects of program that are most and least satisfying to students and faculty, and desired program improvements).

Survey Methodology

The survey was sent via mail and email. An online response form and a website for printing out a PDF file of the form were also available. A follow-up reminder email was sent to non-responding departments and for incomplete returns. The survey was sent initially to 392 U.S. departments that offer a geoscience master's degree—as highest degree offered, as optional or required en route to a PhD, or as a degree parallel and separate from a PhD program.

Response Rate: 33.1% (122 of 369)

Surveys were mailed to 392 departments (in 253 universities) identified (in the *Directory of Geoscience Departments* and other sources) as offering master's degrees, alone or in combination with other degrees. A total of 23 departments responded that they offered no master's degree. The effective survey universe is, therefore, 369 departments.

Responses were received for 122 programs in 115 departments (in 106 universities). By geographical distribution, the responding programs represent a broad cross-section of U.S. geoscience departments, in public and private universities. They are located as follows:

Geographic Region	Number of Responding Programs	% of Total
Pacific & Insular (AK, CA, HI, OR, WA)	21	17.2
South Atlantic (DE, DC, FL, GA, MD, NC, SC, VA, WV)	17	13.9
Middle Atlantic (NJ, NY, PA)	11	9.0
East North Central (IL, IN, MI, OH, WI)	16	13.1
Mountain (AZ, CO, ID, MT, NV, NM, UT, WY)	18	14.8
West North Central (IA, KS, MN, MO, NE, ND, SD)	10	8.2
West South Central (AR, LA, OK, TX)	20	16.4
New England (CT, ME, MA, NH, RI, VT)	4	3.3
East South Central (AL, KY, MS, TN)	5	4.1
Total	122	

By degrees offered, the responding departments may be characterized as follows:

Degrees Offered	No./% of Depts	Faculty size range
M:	3 (2.5%)	3 to 28
B, M:	43 (35.3%)	3 to 28
B, M, D:	69 (56.6%)	3 to 48
M, D:	7 (5.7%)	13 to 36
Total = 122		

This mix of departments by degrees offered matches approximately the breakdown in the *Directory of Geoscience Departments*¹: B, M – 36.0%; B, M, D – 60.8%; M, D – 9.2% (the 3 departments offering a master's only are not geoscience departments and do not appear in the *Directory*; they are interdisciplinary programs in environmental science/studies institutes).

Departments furnished the number of their full-time faculty, the total being 1,787. Faculty size ranged from 3 to 48 faculty members per program, for an average faculty size of 14.6 faculty per program.

Student Demographics

Departments provided data on master's degrees granted and master's candidates (enrollments) for their programs. For both sets of figures (degrees granted and enrollments), the current-year levels (2003) showed an increase over the previous year, while the projections for the following year (2004) showed a decrease (to below the 2002 figures).

Received master's degrees in 2002:	726
Expected to receive master's degrees in 2003:	803 (+10.6%)
Expected to receive master's degrees in 2004:	712 (-11.3%)

¹ *Directory of Geoscience Departments, 41st edition, 2002-2003*, American Geological Institute, 2002.

Master's candidates enrolled in 2002:	2,552
Master's candidates enrolled in 2003:	2,600 (+1.9%)
Master's candidates expected in 2004	2,508 (-3.5%)

Departments also provided information on the citizenship status, gender, and ethnic-minority status of their master's students. These questions, however, were couched in terms of percentages. These percentages were then applied to the number of current students. Thus, the numbers should be viewed as approximations only. In addition, the percentages themselves can be misleading (e.g., "75% of 4 students").

Approximately 14% of the current enrollments are non-U.S. students. In general, foreign student participation rates in the geosciences have been declining over the past 10 years, even in graduate enrollments where foreign students are concentrated. This survey did not investigate the employment patterns specific to non-U.S. graduates, but it is clear that such students' job plans vary considerably from those of U.S. students. A total of 39 programs (32.8%) reported no non-U.S. students.

Female participation in geoscience master's enrollments is quite high and is in keeping with the rates observed in other surveys (e.g., NSF) and in other physical sciences. Furthermore, the participation rate has continued to climb steadily over the past decade. As with the non-U.S. student employment plans, this survey did not measure the job success rate for females. From other sources, we know that female participation is increasing in the geoscience workforce, though not nearly at the levels in enrollments or degrees granted. Six programs (5.0%) reported no enrolled females.

Ethnic-minority student participation is very low and has continued to decline over the past decade. Of the responding programs, 64 (54.7%) reported no ethnic-minority students.

The percentage of students who returned to school five or more years after receiving their undergraduate degree is of interest because geoscience students spend longer than other physical-science students from receipt of bachelor's degree to commencement of graduate study. Slightly more than a third waited for more than five years during that interval.² In the present survey, however, it is unclear if departments were describing their own students returning or students in general. A total of 31 programs (27.4%) reported no returning students.

In response to a question on the source(s) of master's-student support, the major sources were teaching assistantships (34.4%) and research assistantships (29.1%), followed by personal resources (23.4%). It should be noted that students can have more than one source of support.

C. Master's Program Information

Departments were asked to characterize their programs according to orientation and program curriculum. The clear majority (73.7%) indicated they were research oriented, requiring a thesis or research project. Another 18.6% said they were business/industry oriented. While respondents could indicate only one answer, it is likely that these two orientations are complementary and

² Claudy, Nicholas, Megan Henly, and Chet Migdalski, *Earth & Space Science PhDs, Class of 2001*, College Park, MD: American Institute of Physics, American Geological Institute, American Geophysical Union, 2002.

represent a formal preparation of students with an employment credential. Only about 7% consider their programs as preliminary to a PhD.

That conclusion is strengthened by the response to the type of the curriculum: more than a third of the departments offer a combination of traditional geoscience and multidisciplinary curricula. Traditional geoscience was the next most common curriculum type offered.

One measure of the multidisciplinary of a program is the offering of non-geoscience courses. These out-of-field courses are intended to provide a greater breadth of knowledge to students to better prepare them for real-world employment. Slightly more than one-quarter of the programs indicated that their curricula included specific non-geoscience courses. Examples of such courses include water law/policy, GIS, proposal design, environmental dispute resolution, applied statistics, management, earth & environmental journalism, environmental ethics, and economics.

Survey respondents were asked if they would characterize their programs as “professional, (i.e., a program designed specifically to prepare students for careers in traditional fields, such as extractive, natural-resources, environmental, and technical-consulting industries, or non-traditional fields, such as finance or research management). A clear majority (61.7%) answered in the affirmative, but this result may be ambiguous. Some departments clearly understood the intended meaning of the term “professional,” but others probably responded as if the opposite answer were “unaccredited.” Another indicator of respondents misunderstanding the question is that more than 60% of the programs answering “yes” to “professional” were established prior to 1990 (one in 1912). It is unlikely that programs founded before 1990 are “professional” in the sense intended in the question.

The likelihood that the “professional” question was misunderstood casts some doubt on the validity of the answers to questions about the professional programs. A majority of the programs responded that a thesis (58.8%), report (66.7%), or research experience (83.1%) was required. Interestingly, while only 6.9% of the respondents indicated that an off-campus internship was required, 71.8% indicated that such an internship was optional. The programs seem to recognize the value of such an experience and, in fact, seem to be recommending it.

While nearly 60% of the responding programs indicated that their students had a unique orientation program, and more than 80% had formal or informal requirements for this cohort, the examples of such requirements did not seem extraordinary. Most indicated such examples as attendance at mandatory seminars (56.1%) and presentation of research/internship projects at seminars or at regional/national meetings (35.1%).

More than three-quarters of the responding programs indicated that they offer a flexible schedule of classes to their students. These flex schedules are most likely in response to the students’ needs to accommodate their concurrent employment activities, either on-campus (assistantships, etc.) or off-campus (internships or external employment to defray costs). In some cases, external employment may be related to their graduate work.

Not unexpectedly, geoscience master’s students come primarily from undergraduate geoscience programs (69.6%). More than a quarter come from other sciences—including biology, ecology, chemistry, mathematics, physics—and engineering. Only a few (4.4%) come from non-science backgrounds, such as geography, economics, and business.

Departments do seem to be aware of how and why students are attracted to their programs. The top recruitment method cited by departments was their website (35.4%), followed by print advertising (20.8%), and on-campus recruitment (18.1%). The variety of "other" methods, cited by 17.4% of the departments, include professional meetings, personal contacts, reputation of the department, word of mouth, mailings, and alumni contacts.

The perceived reasons for student attraction to a department's programs are also instructive (as well as a bit self-serving). The top three reasons cited were the reputation of the department and its faculty (30.2%), followed by the program curriculum and content (23.4%), and career opportunities (21.5%). The three reasons accounted for 75.1% of the respondents' answers. The other reasons cited comprised 24.9% of the respondents and included cost, department relations with industry (both at 7.2%), and flexibility of course offerings (6.2%). Location, availability of financial support, and availability of part-time study were other reasons given.

Nearly all departments (87.3%) were interested in attracting more master's students. That interest would suggest that there is a real or perceived shortage of students, which affects departmental funding allocations from the host university. On the other hand, 35.8% indicated that they were not interested in developing a "professional" master's program.

Among those wanting to develop a professional program, the reasons given were a perceived need (35.3%), to offer master's students more career options (32.4%), and to attract more students (20.6%).

Departments were asked to provide information on the history of their professional programs. As mentioned earlier, many departments responded with information on the general history of their academic program. Only 19 of the responding programs were started in 1990 or later. Reasons for establishing the programs included student demand, to meet industry/government needs, to address societal needs, to attract students, and to develop a better department.

Slightly more than half of the responding departments had set up no internal or external ties to serve the program, and exactly half said their programs had not been revised since they were founded. Of those programs that had been revised, 39.4% were revised within the last year, 27.3% were revised within the past two years, and 24.2% were revised more than 2 years ago.

Departments were asked to describe the source of their professional program's funding. Of the responding 62 departments, 19 indicated totally internal funding, while only 2 had totally external funding.

Further, slightly more than half (55.7%) indicated the existence of an external advisory group for their programs. For those with such an external group, about half (51.4%) were national in composition, followed by those that were regionally based (37.8%). By composition, almost half (47.4%) were technical, and more than a third were from business (36.8%). Other characteristics of the advisory groups included curriculum input (89.3%), regularly meeting with faculty (64.3%), providing assistance with internships (51.8%), and providing placement assistance (64.3%). Less than half (42.3%) of the advisory groups send their own employees to the program, but 60.7% contribute support to the program, mostly in the form of financial support (44.4%) and internships (37.0%). Most (75.0%) consider themselves potential consumers of the programs' technical and workforce outputs.

About three-fifths of the programs have relationships with other departments/schools on campus, of which slightly more than half (53.3%) are informal relationships. These informal relationships take shape mostly through their course offerings (33.3%) and access to their faculty (32.3%). Formal relationships occur through co-sponsorship of degree (14.1%) and joint degrees with other departments (11.1%).

F. Student/Program Outcomes

Departments provided information about the career advice available to and career choices of their graduates. It is noteworthy that one-third of the responding departments reported no available placement services for its graduates. Where such services are available, two-thirds are offered through the university, while one-third are through the department. These two services are not necessarily exclusive of the other. One might fairly assume that department-based placement services are more likely to be in those departments that offer “professional” degrees. However, of 71 departments offering “professional” degrees, 24 (33.8%) reported no placement services available. Of the 47 departments with “professional” degrees that reported placement services available for its graduates, only 17 (36.2%) were department-based.

In reporting how their graduates were placed into jobs, departments indicated a few noteworthy trends. The primary method by far was through “faculty contacts,” followed by “private contacts” and “word of mouth.” All three of these methods are essentially at a personal level. Not until the fourth most-cited method, “internships/co-ops,” do we find a program-based service. Use of a placement service (university- or department-based) was the sixth most common method. Also, note the relatively rare use of campus recruitment and recruitment at professional meetings.

Departments reported a median starting salary for their graduates of \$37,980, which is significantly lower than the \$41,100 reported by the Occupational Outlook Handbook, citing NACE.

Departments were asked to indicate what percentage of their graduates went to various employment/educational destinations. By number of departments responding, the most commonly cited destination for graduates was continuing their education (PhD program). However, when those percentages were applied to the numbers of graduates, the most common destination for 46.5% was industry—other (i.e., non-research). The second most cited destination was going into a PhD program (28.3%). Further, when asked to describe where geographically the graduates were going, departments responded (as percentage of graduates and in approximate number of graduates) as follows: nationally, regionally, locally, and internationally.

G. Impressions

Finally, departments were asked to characterize the most satisfying and least satisfying aspects of their master’s programs, for their students and for their faculty, as well as providing improvements and changes the departments would like to see in the future.

Most satisfying to students were quality of faculty, quality of education, quality of facilities, and quality of the curriculum/program. These positive aspects included appreciation of research opportunities, faculty mentoring, program flexibility, the general ambiance of the program, and real-world problem solving.

Most satisfying to faculty were quality of students, quality of curriculum/program, and quality of employment placements. Faculty appreciated how students learned and appreciated science, how students provided quality research assistance, how faculty coordinated research and thesis direction, and how well students were able to find rewarding employment.

Least satisfying to students included the time needed to complete degree/program, the frequent lack of employment opportunities, the lack of financial support and resources, the numerous responsibilities of course work, lab work, and teaching, and the lack of additional faculty and desired courses..

Faculty dissatisfaction focused on the amount of additional and uncompensated time required to supervise, mentor, and advise students, the heavy teaching load, the lack of financial support for facilities, research and teaching assistantships, and the quality of students—especially regarding their writing and mathematical skills.

Desired improvements included new programs and course offerings, more financial support for faculty, students, and facilities, recruiting higher-quality students, offering better career preparation to students, exploration of industry partnerships, and adding new faculty.

Concerns/Recommendations

Although a shorter survey *may* have prompted a better response rate, it is also likely that the phrasing, organization, and purpose of the questions contributed to the non-responses. A reworking of the questions—particularly the intent of the questions—by the participating surveying organizations could greatly improve the survey questionnaire

Our email response system generally worked well, and this method's use will only increase for future surveys. Again, a system that is the same for all organizations (with appropriate contextual differences) would allow for ease of analysis.

Unless we can devise a way to derive numbers from responses that ask for percentages, the answers will be suspect. AGI applied percentages to the numbers for enrollments or graduates, and that seems to have produced reasonable approximations.

In spite of a very specific definition of “professional,” respondents answered as if the alternatives were “unaccredited,” or “amateur.” The meaning of the term, along with examples (brochures, web sites, etc.) must be better defined.

Finally, some intense preliminary research at departmental web sites will provide an informed preview of a department's type of response and may provide data that are otherwise not forthcoming.

AMERICAN GEOLOGICAL INSTITUTE
Geoscience Master's Degrees

Please complete a separate questionnaire for each master's program offered by your department.

A. Department Information

Survey Methodology

Paper survey mailed, which included web site for online response and website for printing out PDF file of survey. Follow-up reminder email to non-responding department chairs and for incomplete returns.

Response Rate: 33.1% (122 of 369)

Surveys mailed to 392 departments (in 253 universities) identified as offering master's degrees, alone or in combination with other degrees. No degree = 23: effective survey universe = 369

1. Programs: **122 programs**
2. Department name: **115 departments**
3. Institution name: **106 universities**
4. Address: _____
5. URL: _____
6. Number of full-time faculty: **1,787**

Size of Faculty: **3 to 48: total faculty = 1,787 (avg. size: 14.6 faculty per program)**

7. What degrees are awarded by your department? (Check all that apply)

- Bachelor's
- Master's
- Doctorate

By degrees offered

M: **8 (6.6%)**
B, M: **38 (31.2%)**
B, M, D: **69 (56.6%)**
M, D: **7 (5.7%)**

Faculty size range

3 to 28
3 to 28
3 to 48
13 to 36

Total = 122

8. Name of department chairperson: _____
9. Chairperson's phone #: _____
10. Chairperson's e-mail: _____

B. Student Demographics

1. How many master's graduates in this program:
 - a. Received degrees last year? **726**
 - b. Do you expect to receive degrees this year? **803 (+10.6%)**
 - c. Do you expect to receive degrees next year? **712 (-11.3%)**
2. How many master's students in this program:
 - a. Were enrolled last year? **2,552**
 - b. Are enrolled this year? **2,600 (+1.9%)**
 - c. Do you expect to be enrolled next year? **2,508 (-3.5%)**
3. What percentage of the students in this master's program are non-U.S. citizens? **14.3% (371)**

Non-U.S. students = 371 (14.3% of current enrollments)

119 programs responding (97.5% of total)

Range: 0%-80%

	# Progs	# Students	
0-10%:	72	58	(39 at 0%)
11-20%:	24	93	
21-30%:	12	75	
31-40%:	5	45	
41-50%:	1	4	
51-60%:	2	75	
61-70%:	1	12	
71-80%:	2	9	
Total	119	371	

4. What percentage of the students in this master's program are women? **46.7% (1,214)**

Females = 1,214 (46.7% of current enrollment)

119 programs responding (97.5% of total)

Range: 0%-97%

	# Progs	# Students	
0-10%:	12	3	(6 at 0%)
11-20%:	5	19	
21-30%:	18	89	
31-40%:	26	316	
41-50%:	34	330	
51-60%:	10	192	
61-70%:	11	247	
71-80%:	2	7	
81-90%			
91-100%:	1	11	
Total	119	1,214	

5. What percentage of the students in this master's program are underrepresented minorities (African American, Latino and/or Native American)? **3.9% (100)**

Underrepresented minorities = 100 (3.9%)
117 programs responding (95.9% of total)
Range: 0%-25%

	# Depts	# Students	
0-10%:	107	76	64 at 0%
11-20%:	8	17	
21-30%:	2	7	
Total	117	100	

6. About what percentage of the students in this master's program returned to school five or more years after receipt of their undergraduate degree? 13.3% (332)

Students returning after 5 years = 337 (13.0%)
113 programs responding (92.6% of total)
Range: 0%-80%

	# Depts	# Students	
0-10%:	68	61	(31 at 0%)
11-20%:	19	98	
21-30%:	15	78	
31-40%:	5	35	
41-50%:	4	25	
51-60%			
61-70%:	1	12	
71-80%:	1	28	
Total	113	337	

7. About what percentage of the students in this master's program are supported by:

Students

136 (5.4%)_ Employer (0%-40%)
 144 (5.7%)_ Fellowships (0%-70%)
 588 (23.4%)_ Personal resources (0%-100%)
 731 (29.1%)_ Research assistantships (2%-100%)
 838 (33.4%)_ Teaching assistantships (3%-93%)
 74 (3.0%)_ Other (0%-20%): fed/state employment, grants, tuition waivers,
 N=2,511 foreign governments

C. Master's Program Information

1. Is your master's degree program primarily: (Check only one)
- o Business/industry-oriented: **18.6% (22)**
 - o Preliminary to PhD: **6.8% (8)**
 - o Research-oriented (thesis and/or project required): **73.7% (87)**
 - o Teaching-oriented: **1.0% (1)**
 - o Other (please specify):
- Total = 118**

2. Is your master's degree program curriculum primarily: (Check only one)
- o Traditional Geoscience: **32.2% (39)**
 - o Multidisciplinary: **19.8% (24)**
 - o Traditional and Multidisciplinary: **36.4% (44)**
 - o Individual Design Possible: **3.3% (4)**
 - o Other: **8.3% (10): geology & engineering; applied geology**
- Total = 121**
3. Have any non-geoscience courses been specifically designed/required for your master's degree program?
- o Yes: **27.4% (32)**
 - o No: **72.6% (85) Total = 117**

If yes, please specify: **water law/policy, GIS, proposal design, environmental dispute resolution, applied stats, management, earth & environmental journalism, environmental ethics, economics**

4. Would you characterize your master's degree program as “**professional**” (i.e., a program designed specifically to prepare students for careers in traditional fields, such as extractive, natural-resources, environmental, and technical-consulting industries, or non-traditional fields, such as finance or research management?)
- o Yes: **61.7% (71)**
 - o No: **38.3% (44) Total = 115**

If no, go to question 10.

5. For this “professional” degree:
- a. Is a thesis required?
- o Yes: **42 (56.8%)**
 - o No: **32 (43.2%) Total = 74**
- b. Is a thesis optional?
- o Yes: **27 (37.5%)**
 - o No: **45 (62.5%) Total = 72**
6. For this “professional” degree:
- a. Is a report or project required?
- o Yes: **46 (66.7%)**
 - o No: **23 (33.3%) Total = 69**
- b. Is a report or project optional?
- o Yes: **9 (13.6%)**
 - o No: **57 (86.4%) Total = 66**
7. For this “professional” degree:
- a. Is research experience required?
- o Yes: **56 (83.1%)**
 - o No: **15 (16.9%) Total = 71**

- b. Is research experience optional?
- o Yes: **13 (18.8%)**
 - o No: **56 (81.2%) Total = 69**
8. For this "professional" degree:
- a. Is an off-campus internship required?
- o Yes: **5 (6.9%)**
 - o No: **67 (93.1%) Total = 72**
- b. Is an off-campus internship optional?
- o Yes: **51 (71.8%)**
 - o No: **20 (28.2%) Total = 71**
9. Do the students in the "professional" master's degree program:
- a. Have their own orientation?
- o Yes: **40 (58.8%)**
 - o No: **28 (41.2%) Total = 68**
- b. Have formal or informal program requirements such as seminars or presentations of internship projects?
- o Yes: **57 (82.5%)**
 - o No: **13 (17.5%) Total = 70**
- If yes, please describe: **attend seminars, make presentations at seminars and/or meetings**
10. Is a flexible schedule of classes offered for your students?
- o Yes: **94 (78.3%)**
 - o No: **26 (21.7%) Total = 120**
11. Where do your master's students primarily come from?: **Total = 138**
- o Geoscience: **69.6% (96)**
 - o Other science discipline?: **26.1% (36)** Please specify: **biology/zoology, engineering, ecology, chemistry, math, atmospheric science, physics**
 - o Non-science discipline?: **4.4% (6)** Please specify: **geography, planning**
12. What are the top three ways in which you recruit students for your program? Please rank your answers by numbers using 1, 2, and 3.
- 102 (35.4%)**__ Departmental website **1 = 64.7% (66); 2 = 31.4% (32); 3 = 3.9% (4)**
- 52 (18.1%)**__ On-campus recruitment **1 = 26.9% (14); 2 = 32.7% (17); 3 = 40.4% (21)**
- 24 (8.3%)**__ Online marketing/advertising **1 = 16.7% (4); 2 = 33.3% (8); 3 = 50.0% (12)**
- 60 (20.8%)**__ Print advertising **1 = 13.3% (8); 2 = 38.3% (23); 3 = 48.3% (29)**
- 50 (17.4%)**__ Other **1 = 28.0% (14); 2 = 40.0% (20); 3 = 32.0% (16)**
- T = 288**
- 1: professional meetings, personal contacts, reputation, word of mouth, other departments, contact with GRE students, mailings, alumni**
- 2: meetings, booths at meetings, recruiters to other depts/univs, word of mouth, personal contacts, invitation to school**
- 3: personal contacts, booths at meetings, visits/letters to other univs, recruiting own undergrads, through field camps, word of mouth, faculty contacts, dept reputation**

13. What are the top three reasons students are attracted to your program? Please rank your answers by numbers using 1, 2, and 3.

- 69 (21.5%)__ Career opportunities 1 = 39.1% (27); 2 = 29.0% (20); 3 = 31.9% (22)
 23 (7.2%)__ Cost 1 = 8.7% (2); 2 = 47.8% (11); 3 = 43.5% (10)
 75 (23.4%)__ Curriculum/content 1 = 13.3% (10); 2 = 48.0% (36); 3 = 38.7% (29)
 23 (7.2%)__ Dept/inst relations with industry 1 = 17.4% (4); 2 = 43.5% (10); 3 = 39.1% (9)
 20 (6.2%)__ Flexibility of course offering 1 = 5.0% (1); 2 = 25.0% (5); 3 = 70.0% (14)
 97 (30.2%)__ Reputation of dept/inst/fac 1 = 62.9% (61); 2 = 23.7% (23); 3 = 13.4% (13)
 14 (4.4%)__ Other reasons 1 = 28.6% (4); 2 = 28.6% (4); 3 = 42.9% (6)

T = 321

- 1: accessibility, being part-time student,**
2: specific research opportunities, location
3: location, financial support

14. Is your department interested in attracting more master's students?

- o Yes: 87.3% (103)
 o No: 12.7% (15) Total = 118

15. If your department does NOT now have a "professional" master's program, are you considering developing one?

- o Yes: 17.9% (19)
 o No: 35.8% (38)
 o We already have a "professional" master's program: 46.2% (49) Total = 106

If yes, why? (Check all that apply)

- o To attract more students: 20.6% (7)
 o To offer master's students more career options: 32.4% (11)
 o Because such programs exist in other departments/institutions: 8.8% (3)
 o Request from industry: 2.9% (1)
 o Perceived need: 35.3% (12) Total = 34
 o Other (please specify):

D. Program History

(If your program is not a "professional" master's program, please SKIP this section.)

1. Approximately when was the "professional" master's program established?:

63 departments responded; 19 programs were established in 1990 or later

2. Why was the program established?

To respond to student demand, to meet industry/government needs, to attract industry individuals, to address societal needs, to attract students, to develop better department.

3. Were any internal or external ties set up to serve the program?

- o Yes: 45.4% (30)
 o No: 54.6% (36) Total = 66

4. Has your program been revised since it was established?

- o Yes: **50.0% (33)**
- o No: **50.0% (33) Total = 66**

If yes, when?

- o Within the last 6 months? **9.1% (3)**
- o Within the last year? **39.4% (13)**
- o Within the last 2 years? **27.3% (9)**
- o More than 2 years ago? **24.2% (8) Total = 33**

E. Program Specifics

(If your program is not a "professional" master's program, please SKIP this section.)

1. What percentage of your program is funded:

_____ Internally
_____ Externally

	Int	%		Ext	%
0-20%	8	12.9	81-100%	7	11.3
21-40%	5	8.1	61-80%	6	9.7
41-60%	8	12.9	41-60%	6	9.7
61-80%	17	27.4	21-40%	8	12.9
81-100%	24	38.7	0-20%	35	56.4
	62			62	

2. Is there an external advisory group in place for your master's degree program?

- o Yes: **37 (55.7%)**
- o No: **27 (44.3%) Total = 64**

– If no, go to question 11.

If yes, is it:

- o Local: **3 (8.1%)**
- o Regional: **14 (37.8%)**
- o National: **19 (51.4%)**
- o International: **1 (2.7%) Total = 37**

3. What percentage of your advisory group is:

47.4%_ Technical: **18 (10-100%; 8@100%)**

36.8%_ Business: **14 (15-100%; 2@100%)**

15.8%_ Other (please specify): **6 (15-100%) Faculty; accreditation agency**

4. Does this advisory group provide input into the program curriculum?

- o Yes: **25 (89.3%)**
- o No: **3 (10.7%) Total = 28**

5. Does this advisory group meet regularly with faculty?

- o Yes: **18 (64.3%)**
- o No: **10 (35.7%) Total = 28**

F. Student/Program Outcomes

1. Are placement services offered to your master's students?

- o Yes: **80 (66.7%)**
- o No: **40 (33.3%) Total = 120**

If yes, are these primarily: (Check only one) **(3 checked both)**

- 56 (67.5%)_ University placement services:**
- 27 (32.5%)_ Departmental placement services: Total = 83**

2. What are the top three ways in which graduates of your program have been placed? Please rank your answers by numbers using 1, 2, and 3.

- 7 (2.1%)_ Employment agencies (1=2, 2=2, 3=3)**
- 99 (29.9%)_ Faculty contacts (1=53, 2=34, 3=12)**
- 45 (13.6%)_ Internships/co-ops (1=8, 2=26, 3=11)**
- 28 (8.5%)_ Online sources (1=11, 2=8, 3=9)**
- 22 (6.6%)_ Placement services (1=7, 2=7, 3=8)**
- 54 (16.3%)_ Private contacts (1=17, 2=18, 3=24)**
- 52 (15.7%)_ Word of mouth (1=6, 2=12, 3=34)**
- 18 (5.4%)_ Already employed while student (1=7, 2=3, 3=8)**
- 6 (1.8%)_ Other (please specify)**

T=331 **1=2: industry interviews, company requests:**
 2=1: industry reps to campus, students' initiative:
 3=3: tied to internships, professional meetings, campus recruiters

3. What is the average range of starting salaries for graduates of this master's degree program?

- o \$24,999 per year or less: **0**
- o \$25,000 - \$29,999: **8 (8.3%)**
- o \$30,000 - \$34,999: **25 (25.8%)**
- o \$35,000 - \$39,999: **26 (26.8%)**
- o \$40,000 - \$44,999: **14 (14.4%)**
- o \$45,000 - \$49,999: **8 (8.3%)**
- o \$50,000 - \$54,999: **9 (9.3%)**
- o \$55,000 - \$59,999: **2 (2.1%)**
- o \$60,000 - \$64,999: **4 (4.1%)**
- o \$65,000 - \$69,999: **1 (1.0%)**
- o \$70,000 - \$74,999: **0**
- o \$75,000 or more per year

Total = 97

4. What percentage of the graduates of your master's program go into:

60 (17.3%)_ Industry – research: (5-90%)	109	16.4
94 (27.1%)_ Industry – other: (2-100%)	309	46.5
99 (28.5%)_ PhD programs: (2-90%)	188	28.3
91 (26.2%)_ Teaching: (1-60%)	56	8.4
3 (0.9%)_ Other	3	0.5

T = 347

T = 665

5. What percentage of the graduates of your master's program are getting employed:

77 (25.9%)_ Locally: (1-95%)	187	27.1%
86 (29.0%)_ Regionally: (5-90%)	193	28.0%
87 (29.3%)_ Nationally: (1-100%)	260	37.7%
47 (15.8%)_ Internationally: (1-40%)	50	7.3%
Total = 297	T = 690	

G. Impressions

1. What aspects of the master's program are most satisfying to students? **76 responses**

selected responses:

opportunity to teach and to learn research techniques, to develop research skills
 strong support (intellectual and fiscal) for research (RAs, equipment, space)
 strong faculty
 "excellent up-to-date instruction from faculty well-versed/well-known in field"
 "relationships with faculty (professional)"
 good faculty mentors
 small classes
 evening classes offered
 ability to study part-time while working professionally
 using geological education to solve real-world problems
 interdisciplinary courses; team projects
 program flexibility
 preparation for PhD
 practical courses and experience in applied subjects
 problem-solving methodology, public-service projects, internships
 field methods, writing reports
 appealing curriculum
 breadth of courses
 degree flexibility for individual needs
 academic rigor, research/field-work opportunities
 rapport among students and among students and faculty
 available employment possibilities
 interdepartmental nature of program, management aspect
 university location

2. What aspects of the master's program are most satisfying to faculty? **76 responses**

selected responses

watching students learn and appreciate science
 graduate research work provides support to externally funded grants/proposals
 administration support to provide positive field experiences
 academic rigor, research/field-work opportunities
 balance between teaching and research

mentoring students; coordinating research
 high-quality students, to help with teaching and research
 to direct research/thesis
 teamwork approach to research projects
 intellectual development, problem-solving
 placement of students after degree program completed
 having students focusing on something in addition to science
 preparing students for PhD
 graduate students can conduct field research, supervise undergraduates
 thesis presentations; professional talks by students at meetings;
 work ethic
 excellent connections to industry
 teaching graduate classes, conducting advanced research, enhancing reputation of dept
 broad interaction with other faculty

3. What aspects of the master's program are least satisfying to students? **70 responses**

selected responses

pressure to finish in 2 years and complete significant research
 lack of local employment
 financial burden
 difficulty of completing thesis while working, limited course offerings
 grant writing
 thesis writing - a significant number do not finish
 lack of assistantships and other financial support
 required math & hydraulics courses
 remedial courses; lack of support during summer; no health insurance; lack of work
 experience/internships; better job opportunities
 lack of faculty to offer more courses
 university red tape
 multidisciplinary coursework
 lack of space; need for more equipment
 teaching requirement
 lack of financial resources
 time and money
 dated computer equipment; certain difficult faculty advisors
 mathematical rigor of requirements
 level of lab support
 amount of writing
 lack of jobs (especially in mining) for geology students, while engineering students find jobs easily
 length of program, but now being shortened - from 3-4 years to 1.5-2.5 years
 tedium of collecting data in lab
 poor library resources
 cost of living in Seattle
 time in teaching introductory-level labs

4. What aspects of the master's program are least satisfying to faculty? **63 responses**

selected responses

time needed to supervise students and get them started
 little university financial support for graduate program
 lack of students' commitment
 students get a job before finishing program, or lose focus
 poor writing skills of students
 inadequate physical science/math training of some students
 faculty get no pay, credit, or release for mentoring/teaching/advising graduate students
 heavy teaching loads
 core-course teaching
 red tape
 lack of space; need for more equipment
 lack of ability to attract major grants
 limited number of faculty constrains breadth of program, leads to heavy teaching loads, detracts from
 research time with students
 lack of university respect
 lack of high-quality American students
 primary faculty responsibility to undergrads, low graduate enrollments (possible course cancellations,
 graduate/undergraduate classes combined
 recruiting and difficulty in finding students
 limited compensation for involvement and extra work

5. What kinds of improvements to your master's program would you like to see? **62 responses**

selected responses

seeking approval for PhD program
 improved course offerings, course offerings in line with industry interests
 more financial help from university
 core courses offered on regular basis
 more motivated students, higher completion rates
 considering professional MS degree and/or certificate programs; improve group cohesiveness and cross-
 campus collegiality of participating faculty
 university no longer offers support for terminal MS degree in the sciences. Thus, all MS students either
 supported by employer or are en route to PhD
 develop more rigorous standards for MS; more summer support
 more external funding; better, more diverse student population; higher publication rate
 attract earth-science teachers into program for their continuing education
 summer support for all MS students
 increased rigor in coursework
 increase TA stipends; establish endowed funds for RAs
 partner with industry; establish a PSM
 expansion into minerals & petroleum exploration-would require more faculty (geoscience & engineering)
 with petroleum exploration experience; depends on faculty retirements

formalize internships and exchange programs for study abroad

more high-quality American students

more online offerings

better career preparations for students

for current program: decrease time to complete & get more students; also develop new applied

environmental MS, non-thesis, course and intern oriented

replacement faculty for retiring members

better library resources, more technical/laboratory support, reassigned load for advising grad students

become more quantitative and practical-skills oriented; increase emphasis on GIS and modeling

Participating Universities

Baylor University	Dept of Geology
Boston College	Dept of Geology & Geophysics
Bowling Green State University	Dept of Geology
California Polytechnic State University	Dept of Earth & Soil Sciences
California State University, Chico	Dept of Geology & Environmental Science
California State University, Fresno	Dept of Earth & Environmental Sciences
California State University, Long Beach	Dept of Geological Sciences
California State University, Northridge	Dept of Geological Sciences
California University of Pennsylvania	Dept of Earth Sciences
Central Washington University	Dept of Geological Sciences
Clemson University	School of the Environment
Colorado School of Mines	Dept of Geology & Geological Engineering
Columbia University	Dept of Earth & Environmental Sciences
East Carolina University	Dept of Geology
Eastern Kentucky University	Dept of Earth Sciences
Florida State University	Dept of Geological Sciences
Hardin-Simmons University	Dept of Geological Sciences & Environmental Management
Illinois State University	Dept of Geography-Geology
Indiana University	School of Public & Environmental Affairs
Indiana University/Purdue University, Indianapolis	Dept of Geology
Indiana State University	Dept of Geography, Geology, & Anthropology
Lehigh University	Dept of Earth & Environmental Sciences
Loma Linda University	Dept of Natural Sciences, Geology Program
Louisiana State University	Dept of Ocean & Coastal Sciences
Marshall University	Dept of Physical Sciences
Massachusetts Institute of Technology	Dept of Earth, Atmospheric, & Planetary Sciences
Michigan Technological University	Dept of Geological & Mining Engineering & Sciences
Mississippi State University	Dept of Geosciences
Montana Tech of The University of Montana	Dept of Geological Engineering
Montclair State University	Dept of Earth & Environmental Studies
Murray State University	Dept of Geosciences
New Mexico State University	Dept of Geological Sciences
North Carolina State University	Dept of Marine, Earth & Atmospheric Sciences
Northeastern Illinois University	Dept of Earth Science
Northwestern University	Dept of Geological Sciences
Nova Southeastern University	Dept of Geology & Geophysics
Nova Southeastern University	Institute of Marine & Coastal Studies
Ohio University	Dept of Environmental Studies
Old Dominion University	Dept of Ocean, Earth & Atmospheric Sciences
Oregon State University	Dept of Geosciences
Pennsylvania State University	Dept of Geosciences
Radford University	Dept of Geology
Rensselaer Polytechnic Institute	Dept of Earth & Environmental Sciences
Rice University	Wiess School of Natural Sciences
Rutgers, The State University of New Jersey	Dept of Geological Sciences
San Diego State University	Dept of Geological Sciences
San Jose State University	Dept of Geology
South Dakota School of Mines & Technology	Dept of Atmospheric Science
South Dakota School of Mines & Technology	Dept of Geology & Geological Engineering
South Dakota State University	Dept of Plant Science
Stephen F. Austin State University	Dept of Geology
SUNY, College at Oneonta	Dept of Earth Sciences
SUNY, College of Environmental Sciences	Faculty of Environmental Studies
Tarleton State University	Dept of Chemistry, Geosciences & Environmental Science
Temple University	Dept of Geology

Texas A&M University	Dept of Geology & Geophysics
Texas A&M University	Dept of Oceanography
Texas Christian University	Dept of Geology
University of Alabama	Dept of Geological Sciences
University of Alaska Fairbanks	Dept of Geology & Geophysics
University of Arizona	Dept of Geosciences
University of California, Davis	Dept of Land, Air, & Water Resources – Atmospheric Sciences
University of California, Davis	Dept of Land, Air, & Water Resources – Hydrology Program
University of California, Davis	Graduate Group in Hydrologic Sciences
University of California, Santa Barbara	Dept of Geological Sciences
University of Cincinnati	Institute of Environmental Science
University of Colorado at Boulder	Dept of Geography
University of Florida	Dept of Geological Sciences
University of Houston	Dept of Geosciences
University of Idaho	Dept of Geological Sciences
University of Illinois, Urbana-Champaign	Dept of Atmospheric Science
University of Illinois, Urbana-Champaign	Dept of Geology
University of Iowa	Dept of Geoscience
University of Kentucky	Dept of Geological Sciences
University of Louisiana at Lafayette	Dept of Geology
University of Louisiana at Monroe	Dept of Geosciences
University of Maine	Dept of Geological Sciences
University of Miami	Dept of Atmospheric Science
University of Miami	Dept of Marine Geology & Geophysics
University of Michigan	Dept of Geological Sciences
University of Minnesota, Duluth	Dept of Geological Sciences
University of Missouri, Columbia	Dept of Geological Sciences
University of Missouri, Columbia	Dept of Soil & Atmospheric Sciences
University of Montana	Dept of Geology
University of Nebraska, Lincoln	Dept of Geosciences
University of Nevada, Las Vegas	Dept of Geoscience
University of Nevada, Reno	Graduate Program of Hydrologic Science
University of New Haven	Dept of Biology & Environmental Science
University of North Carolina, Charlotte	Dept of Geography & Earth Sciences
University of North Carolina, Wilmington	Dept of Earth Sciences
University of North Dakota	Dept of Geology & Geological Engineering
University of North Texas	Dept of Biological Science
University of Northern Arizona	Dept of Geology
University of Northern Colorado	Dept of Earth Sciences
University of Oklahoma	Dept of Civil Engineering & Environmental Science
University of Oregon	Dept of Geography
University of Rochester	Dept of Earth & Environmental Sciences
University of South Florida, Tampa	Dept of Geology
University of Southern California	Dept of Earth Sciences
University of Texas, Austin	Dept of Geological Sciences
University of Texas, Austin	Dept of Marine Science
University of Texas, Dallas	Dept of Geosciences
University of Texas, El Paso	Dept of Geological Sciences
University of Tulsa	Dept of Geosciences
University of Utah	Dept of Mining Engineering
University of Washington	School of Oceanography
University of Wisconsin-Green Bay	Dept of Environmental Science & Policy
University of Wisconsin-Madison	Dept of Geology & Geophysics
Utah State University	Dept of Geology
Virginia Polytechnic Institute & State University	Dept of Geological Sciences
Washington University	Dept of Earth & Planetary Sciences
Washington State University	Dept of Geology
Western Washington University	Dept of Geology

SLOAN
Cost Sheet

	Grant Amount	Total Expenses As of 7/31/03	Remaining Balance
Salaries/Labor/Benefits	35,500.00	19,612.19	15,887.81
Travel	1,000.00	0.00	1,000.00
Printing	5,000.00	182.88	4,817.12
Computer	2,000.00	1,211.52	788.48
Supplies/Postage	<u>1,000.00</u>	<u>303.95</u>	<u>696.05</u>
Total Direct Costs	44,500.00	21,310.54	23,189.46
Indirect	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
TOTAL	44,500.00	21,310.54	23,189.46