



Center for Innovation and Research
in Graduate Education

Astrobiology Student Survey Report: Fall 2006

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Introduction

In Fall 2006, the Center for Innovation in Graduate Education (CIRGE) administered two web-based surveys, using the Catalyst WebQ program, to students in the Astrobiology IGERT Program. The surveys were designed by Deena Heg and administered by Jaya Ramesh. Initial results were also compiled by Jaya Ramesh.

The surveys were designed as components of the multi-year evaluation of the Astrobiology (AB) IGERT conducted by CIRGE, in accordance with the National Science Foundation grant requirements. The results are intended to provide anonymous student feedback to the program faculty and to increase understandings of interdisciplinary graduate programs and student experiences of those programs. Interdisciplinary programs aim to broaden the views, skills, methods, and questions of a disciplinary approach to scientific problems. This evaluation is interested in student experiences of the Astrobiology IGERT Program's interdisciplinary approach.

Survey 1 was administered to all AB continuing students who were contacted via email. Three women and nine men answered the survey. Students were at various stages of the Astrobiology Program. All had completed at least one year of the program, and one-third had completed most program requirements.

Survey 2 was administered to all AB incoming students, who were also contacted via email. Two women and four men returned the survey.

Survey 1 asked 56 questions about expectations for and experiences with the program; previous study and work, and demographics, while Survey 2 was shorter (34 questions), omitting most questions about student's experience with the program. The report combines results from both surveys.

Summary: Continuing students

Students had mostly positive feedback on many of the AB components, including classes, research rotations, workshops, and other opportunities. In the survey report below, they elaborate on rewards of the AB IGERT program, their expectations that it will help them in their careers, the teamwork it involves, and the writing skills it enhances. They also commented on its interdisciplinarity. Students were less enthusiastic about the ethics series.

Summary: Incoming students

This survey, administered at the beginning of the students' affiliation with the Astrobiology IGERT program, provided demographic information about the respondents and their motivations for getting a certificate in Astrobiology. Most of their answers echoed those of the returning students. They understood the program requirements and had similar reasons for getting the AB certificate. Their ideas about what interdisciplinarity meant were also very similar. All respondents think the AB certificate will enhance their career choices. Most students expect

that the AB IGERT has or will provide them with special knowledge outside of their discipline they would not have otherwise obtained.

Astrobiology Certificate

Continuing students had completed the following requirements of the AB certificate program at the time of the survey (Fall 2006):

- All 12 students had taken 502
- 11 students had taken 501
- 9 students had taken Seminar Series
- 4 students had done the research rotation
- 9 students had done the field workshops

Why did you choose to get a certificate in AB (more than one answer was possible)

	Incoming	Continuing
Interesting topic	2	7
Interdisciplinary program	1	4
The breadth of the field	3	2
Cutting-edge/relevant research	3	1
Rigorous program	0	1

All students thought that the AB certificate would enhance their career choices. The students agreed that the AB IGERT provides special knowledge outside of their discipline they would not have gained otherwise.

Do you think that the AB IGERT has or will provide you special knowledge outside of your discipline that you would not have otherwise? (more than one answer was possible)

	Incoming	Continuing
	Yes: all	Yes: all
Additional knowledge & research topics	4	8
Communication with peers/scientists across disciplines	1	5
Networking/teambuilding	0	5

Specific examples given include:

- the ability to know how to work with others from other disciplines
- learning how to investigate problems in different fields
- understanding the open problems in other fields
- understanding how other disciplines do science
- having a sophisticated understanding of all basic sciences (chemistry, biology etc)
- becoming involved in community outreach, interdisciplinary research
- learning to communicate across other disciplines

In what employment sectors do you anticipate pursuing your career? (more than one answer was possible)

	Incoming	Continuing

Academic	6	12
Government	1	6
Non-Profit	2	4
Business/Industry	0	4

All incoming students expected to work in academia, two of them could imagine careers in government and/or the non-profit sector. The picture is slightly more varied for the continuing students. Four can see themselves only in academia, one considers only a non-profit organization, while eight anticipate careers in either academe or other employment sectors

How much additional time do you think you will need beyond your home department requirements to complete a certificate in AB?

	Continuing
0 Quarter	1
1-2 Quarters	7
3 Quarters	2
4-5 Quarters	2

Interdisciplinarity

All students –incoming and continuing- saw the AB program as interdisciplinary, and defined interdisciplinarity in the following ways:

How do you define interdisciplinarity? (more than one answer was possible)

	Incoming	Continuing
Using different tools to solve a research question	1	3
Combining many traditional fields to look at one field from several vantage points	4	5
People from different disciplines interacting/communicating for the benefit of science	2	1
Communicate and conduct research that uses knowledge from more than one field of expertise	0	4

Two-thirds of the continuing students said that they were inspired to formulate innovative research questions and to think in a new way about AB research. Two examples: “Interplays between evolution of the biosphere and atmospheric evolution.” “2 AB IGERT students and myself have worked on a project outside of our academic duties. It was recently presented at an international conference.”

How do you identify yourself as a scholar?

	Incoming	Continuing
Home department	0	2
AB scholar	1	2
AB scholar & home department	3	6
My discipline with an interest in AB	2	2

One student said, “In a lot of ways I feel closer to the AB students than to the students in my own department. I can’t view my research in my own department as separate from my research in AB.”

Teamwork

With one exception, all the students are working in teams in some capacity; half of them often work in teams. Teamwork was involved mostly on class presentations, posters, papers, journal clubs, research projects and publications.

Most students stated that they worked with students whom they considered IGERT Fellows. They also worked with undergraduates, faculty and post-docs. One student collaborates with someone at another institution.

Half the students found this teamwork very valuable to their own research and development as a scholar; the other half found it fairly or somewhat valuable.

“I formed a journal club to discuss papers in the field of planetary science with other graduates. Weekly meetings resulted in a project examining the utility using fuel cell energy in lander missions.”

All continuing students agreed that the AB program provides opportunities for community building outside of class. Some of them gave examples such as social events, workshops and going out for a beer.

Courses

All students who had completed the 501 course agreed that it provided a comprehensive introduction to the major disciplines and vocabulary in AB. One student added that “at least it did a good job in the time allowed to it.”

All students agreed that the 502 course provided a multidisciplinary approach to the selected AB topic. Some elaborated that the course approached research questions from many sides, and that the topics selected were covered well.

Research Rotations

Eight of the twelve students had not yet completed their research rotations at the time of the survey. Thus the comments below cover only a third of the survey population.

How did the research rotation contribute to your development as a researcher?

- Learned new analytical techniques and research tools
- Collaborative connections, forced to communicate with scientists outside of field.
- Exposed to a number of new topics, and foreign research environments

How did you choose the field in which you did your research rotation?

Most students were advised by their professor or were interested in the professor's research. One student was interested in technology and for that reason chose the specific research lab.

Ethics

Students had mixed reactions to the ethics lectures and discussions. 8 of the 12 students had participated in the lectures addressing ethics.

What ethical issues were discussed in the AB classes?

- Planetary protection
- Nuclear /radioactive material on space missions
- Utilitarian view of science, value of science, integrity of science
- Re-creation of life, mixing genes to create "hybrids"
- Does AB contribute to the common good of humanity
- What is meant by "good"
- Scientific secrecy versus communication

Have these discussions about ethics changed the way in which you perceive ethics?

- "I think I learned more about ethics going to conferences and studying papers in AB classes than the Ethics seminar"
- "Important as internal ethostat, not just external annoyance"
- "Demonstrated that ethics can be codified and semanticized and made terribly boring, or it can stimulate interesting discussions that actually lead to better understanding of the issues involved"
- "Of course I learned something. Did it totally rock the foundations of my philosophical life? Of course not."
- "I am glad ethics is receiving this sort of attention in the AB community."

Writing

Students have done the following types of science writing for the AB program:
Term papers, journal articles, review articles, conference papers, topic mini-reviews.

Have you published any of your writings?

Published writing	Incoming	Continuing
Yes	2	4
No	4	8

Types of publications include technical papers, conference papers, AB newsletters, theoretical research papers, and a book chapter. The publications included ICARUS, Applied and Environmental Microbiology, Geophysical Newsletters, Astronomical Journal, and the 2006 International Astronautical Congress.

Six of the twelve continuing students affirmed that the AB program helped develop science writing skills so that people from their own disciplines, other disciplines and/or lay audiences can understand the content. Two students disagreed.

Special Skills

*What special skills have you acquired with your participation in the AB program?
(more than one answer was possible)*

	Continuing
Learned a new research technique	9
Working in multidisciplinary teams	9
Giving presentations at diverse conferences	10
Teaching	5
Publishing	2
Grant writing	1

Most Rewarding Experience

What has been your most rewarding experience in AB thus far? (continuing students)

- Workshops and field trips - 7
- AB topics - 2
- Helping teach the workshop - 2
- Interaction with students from diverse fields - 2

“I very much enjoyed the recent retreat in Yellowstone. I thought the collected experiences epitomized interdisciplinary learning.”

“AB workshops - we learn a ton and get a chance to bond with students and faculty and there is time to talk with people about all sorts of crazy research ideas and explore possible new areas of research.”

“The field trips! They motivate me to learn more about other fields after seeing the neat stuff they study in real life.”

“The simple fact that I get to spend my grad school career thinking about the origin and evolution of life on Earth and beyond.”

Demographics

Gender

	Incoming	Continuing
Female	2	3
Male	4	9

Race/Ethnicity

	Incoming	Continuing
White:	4	10
Latino/a or Chicano/a :	1	1
Asian	0	1
Other:	1	0

Citizenship Status

	Incoming	Continuing
U.S. Citizen	4	9
Temporary Visa	2	3

Age

	Incoming	Continuing
Age Range	22-27	24-36

Are you the first in your family to go to graduate school?

	Incoming	Continuing
Yes	0	5
No	6	7

Undergraduate Degree

	Incoming	Continuing
BA	2	2
BS	4	10

Full time work experience before graduate school

Employment Area	Incoming (5)	Continuing (6)
Science R&D	3	3
Science education	2	2
Other	0	1