

# **AGEP** Alliances for Graduate Education and the Professoriate **Info Brief VI**

## **Increases in the Number and Percent of Underrepresented Minority Graduate Student Enrollees in STEM at AGEP Institutions**

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March 2008

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## SUMMARY

One of the goals of the National Science Foundation (NSF) Alliances for Graduate Education and the Professoriate (AGEP) Program, which began in 1998, is to increase the number of underrepresented minority (URM) students<sup>1</sup> pursuing advanced degrees in science, technology, engineering and mathematics (STEM). (See program description at bottom of page.<sup>2</sup>) Analyses of graduate student enrollee data from AGEP institutions indicate that the AGEP Program is achieving the goal of increasing the annual number of URM who are pursuing advanced degrees in STEM graduate school programs.

### **Number and Percent of URM Graduate Student Enrollees in STEM Graduate Programs at AGEP Institutions in 2006/07**

In 2006/07 -- 11,157 URM were enrolled in STEM Graduate Programs at 67 AGEP institutions. Of the 11,157 URM graduate student enrollees in STEM fields for 2006/07:

- 7,620 or 68.3% were in Natural Sciences and Engineering (NS&E).
- 1,524 or 13.7% were in Other Social Sciences.
- 1,005 or 9.0% were in Psychology.
- 389 or 3.5% were in Sociology.
- 287 or 2.6% were in Political Science.
- 196 or 1.8% were in Interdisciplinary Sciences.
- 136 or 1.2% were in Economics (*Table 1*).

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<sup>1</sup>URM students are African Americans, Hispanic Americans, and Native Americans who are U.S. citizens or permanent residents.

<sup>2</sup>**Program Description:** The goal of the National Science Foundation (NSF) Alliances for Graduate Education and the Professoriate (AGEP) Program is to increase the number of underrepresented minority students pursuing advanced study, obtaining doctoral degrees, and entering the professoriate in STEM disciplines (including Social Sciences). Alliances participating in this program are expected to engage in comprehensive institutional cultural changes that will lead to sustained increases in the conferral of STEM doctoral degrees, significantly exceeding historic levels of performance. Specific objectives of AGEP are: (1) to develop and implement innovative models for recruiting, mentoring, and advancing minority students in STEM doctoral programs, and (2) to develop effective strategies for identifying and supporting underrepresented minorities who want to pursue academic careers.

Of the 7,620 URM graduate student enrollees in NS&E at 67 AGEP institutions in 2006/07:

- 2,731 or 35.8% were in Engineering.
- 2,469 or 32.4% were in Biological, Agricultural Sciences.
- 671 or 8.8% were in Chemistry.
- 539 or 7.1% were in Other Physical Sciences.
- 516 or 6.8% were in Computer Sciences.
- 428 or 5.6% were in Mathematics.
- 240 or 3.1% were in Earth, Atmospheric, Ocean Sciences.
- 179 or 2.3% were in Computer Engineering (*Table 1*).

#### **About Changes in the Annual Number of URM Enrollees in STEM Graduate Programs at AGEP Institutions from 2000/01 to 2006/07**

An analysis of URM graduate student enrollee data from 2000/01 to 2006/07 for 67 AGEP institutions from 21 Alliances indicates that the annual number of URM graduate students enrollees in STEM increased from 9,178 to 11,157. Thus, in the past six years the annual number of URM enrolled in STEM graduate programs at the 67 AGEP institutions increased by 21.6% or 1,979. During this same period, the annual number of URM graduate student enrollees in Natural Sciences and Engineering (NS&E) increased from 5,924 to 7,620. Thus, in the past six years the annual number of URM enrolled in NS&E graduate programs at the 67 AGEP institutions increased by 28.6% or 1,696 (*Table 1*).

The annual number of URM graduate student enrollees at the 67 AGEP institutions increased in thirteen specific fields between 2000/01 and 2006/07 from:

- 1,828 to 2,469 in the Biological/Agricultural Sciences (an increase of 641).
- 2,133 to 2,731 in Engineering (an increase of 598).
- 397 to 539 in Other Physical Sciences (an increase of 142).
- 867 to 1,005 in Psychology (an increase of 138).
- 544 to 671 in Chemistry (an increase of 127).
- 336 to 428 in Mathematics (an increase of 92).
- 105 to 196 in Interdisciplinary Sciences (an increase of 91).
- 170 to 240 in Earth, Atmospheric, and Ocean Sciences (an increase of 70).

- 447 to 516 in Computer Sciences (an increase of 69). Also, Computer Engineering increased from 175 to 179 (an increase of 4).
- 1,468 to 1,524 in Other Social Sciences (an increase of 56).
- 335 to 389 in Sociology (an increase of 54).
- 113 to 136 in Economics (an increase of 23).

During the same time period at the 67 AGEP institutions, there was a decline in the number of graduate student enrollees in Political Sciences from 366 to 287 (a decrease of 79). Increases in the percent of URM graduate student enrollees from 2000/01 to 2006/07 at the 67 AGEP institutions ranged from 86.7% in Interdisciplinary Sciences and 41.2% in Earth, Atmospheric, and Ocean Sciences to 2.3% in Computer Engineering and 3.8% (56) in Other Social Sciences (*Table 1*).

Over 15% (15.9% or 314 of the 1979) of the increase in the number of URM graduate student enrollees in STEM between 2000/01 and 2006/07 was due to increases at nine campuses of the University of California (UC) (*Table 3*).

#### **Comparison of Percent Change in the Annual Number of Graduate Student Enrollees in STEM Graduate Programs for URM and All Other U.S. Citizens and Permanent Residents at AGEP Institutions**

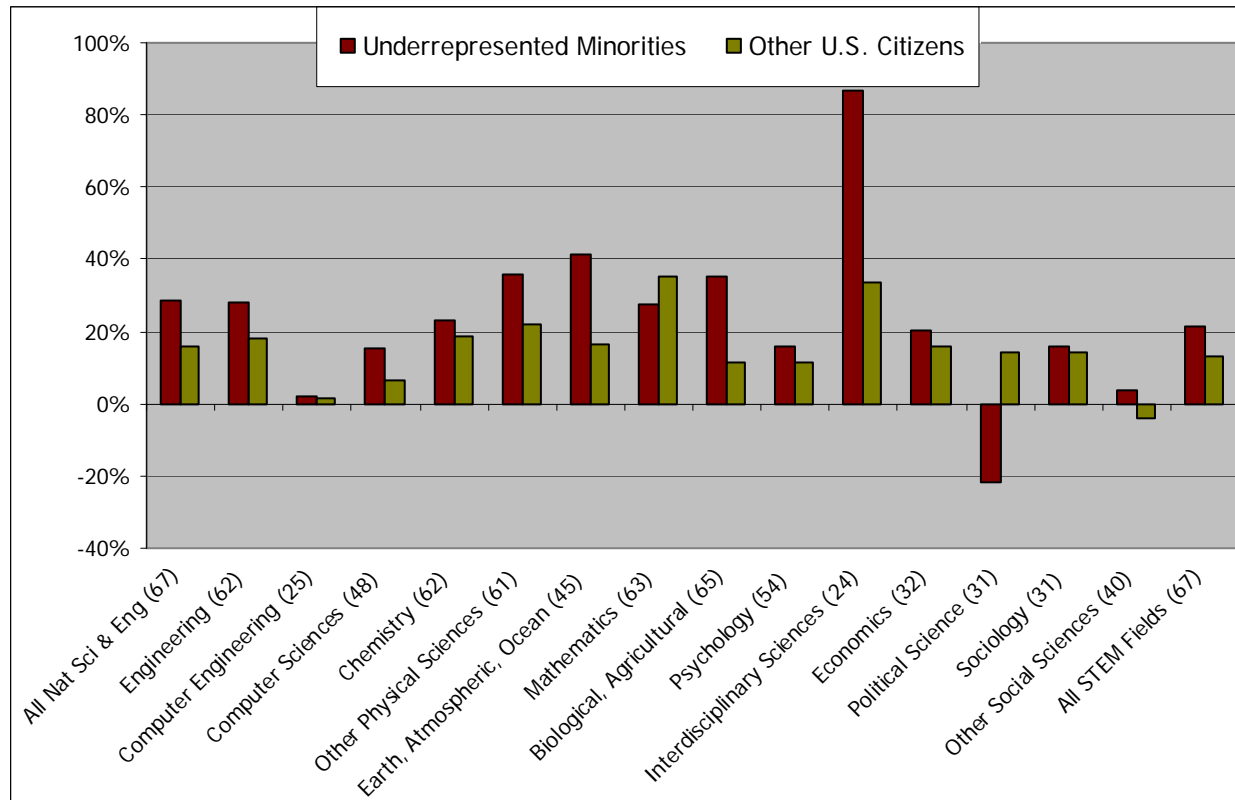
From 2000/01 to 2006/07, the percent change in the annual number of graduate school enrollees from 2000/01 to 2006/07 in NS&E was higher for URM than for all other U.S. citizens and permanent residents<sup>3</sup> (28.6% vs 15.7%). In regards to specific fields, the percent change of graduate student enrollees was much higher for URM than for all other U.S. citizens and permanent residents in Interdisciplinary Sciences (86.7% vs 33.4%); Earth, Atmospheric, and Ocean Sciences (41.2% vs 16.6%); Biological, Agricultural Sciences (35.1% vs 11.7%); and Engineering (28.0% vs 18.1%); (*Figure 1 and Table 4*).

<sup>3</sup>All other U.S. citizens or permanent residents does not include African Americans, Hispanic Americans, and Native Americans.

At the nine campuses of the University of California (UC) the percent change of graduate student enrollees from 2000/01 to 2006/07 in NS&E was higher for URM than for all other U.S. citizens and permanent residents (46.7% vs 21.1%) (Table 5).

**Figure 1: Percent Change in Annual Number of URM and All Other U.S. Student and Permanent Resident Graduate Student Enrollee by Broad STEM Categories at AGEP Institutions from Early AGEP (2000/01-2002/03) to 2006/07 (N = 67 Institutions)**

(The numbers in parentheses represent the number of institutions reporting data in the field.)



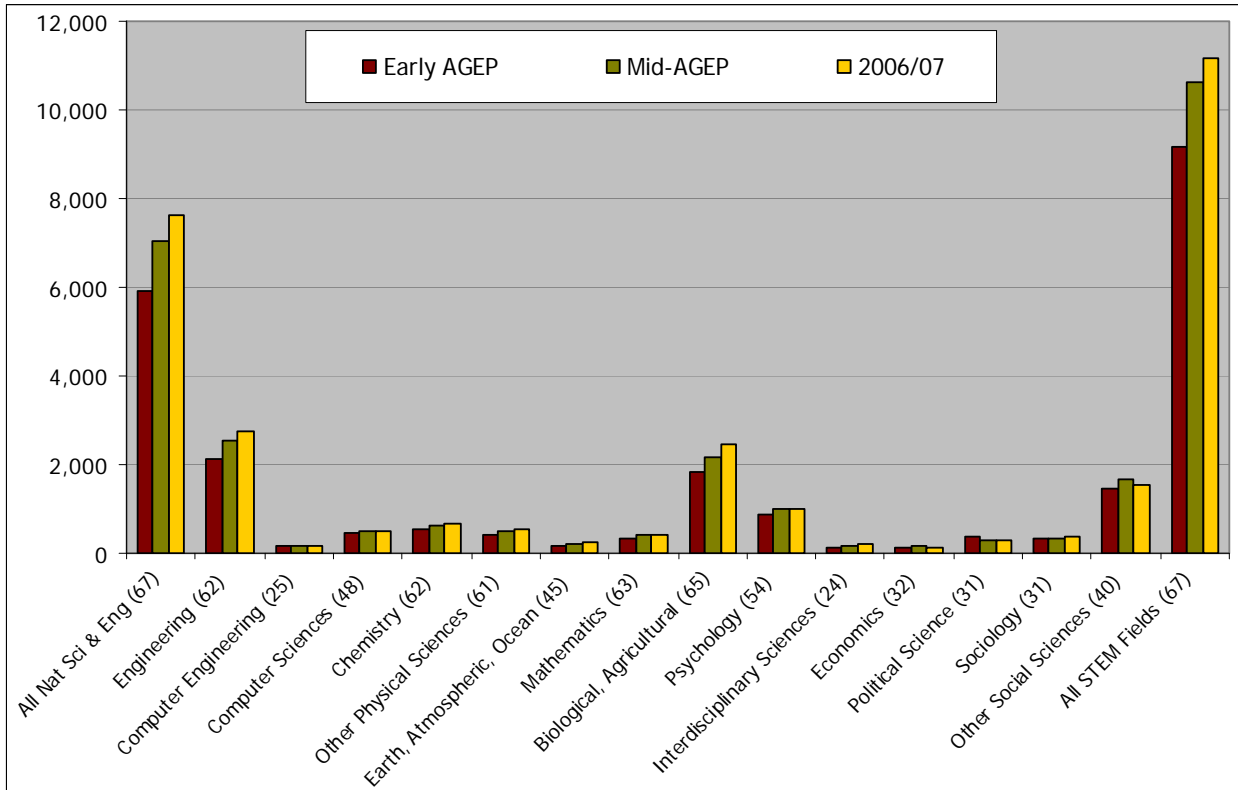
(Numbers for this Figure are in Table 4.)

**Underrepresented Minorities (URM)** include African Americans, Hispanic Americans, and Native Americans.

**Other U.S. citizens** includes permanent residents and does not include African Americans, Hispanic Americans, and Native Americans.

**Figure 2: Changes in the Annual Number of URM Graduate Student Enrollees by Broad STEM Categories in AGEP Institutions from Early AGEP (2000/01-2002/03) to 2006/07 (N = 67 Institutions)**

(The numbers in parentheses represent the number of institutions reporting data in the field.)



(Numbers for this Figure are in Table 4.)

Underrepresented Minorities (URM) include African Americans, Hispanic Americans, and Native Americans.

**Table 1 – Number and Percent Change in the Annual Number of URM Graduate Student Enrollees in STEM Graduate Programs from 2000/01 to 2006/07, including Nine Campuses of the University of California\***

(The numbers in parentheses represent the number of institutions reporting data in the field.)

Enrollees Underrepresented Minorities (all)	Early AGEP Years 2000/01 to 2002/03	Mid-AGEP Years 2003/04 to 2005/06	Year 2006/07	Early AGEP to 2006/07 Change	Early AGEP to 2006/07 Percent Change
<b>All Natural Sciences &amp; Engineering (67)</b>	5,924	7,022	7,620	1,696	28.6%
Engineering (62)	2,133	2,552	2,731	598	28.0%
Computer Engineering (25)	175	180	179	4	2.3%
Computer Sciences (48)	447	516	516	69	15.4%
Chemistry (62)	544	631	671	127	23.3%
Other Physical Sciences (61)	397	504	539	142	35.8%
Earth, Atmospheric, Ocean (45)	170	204	240	70	41.2%
Mathematics (63)	336	402	428	92	27.4%
Biological, Agricultural (65)	1,828	2,176	2,469	641	35.1%
Psychology (54)	867	980	1,005	138	15.9%
Interdisciplinary Sciences (24)	105	153	196	91	86.7%
Economics (32)	113	153	136	23	20.4%
Political Science (31)	366	310	287	-79	-21.6%
Sociology (31)	335	349	389	54	16.1%
Other Social Sciences (40)	1,468	1,672	1,524	56	3.8%
<b>All STEM Fields (67)</b>	<b>9,178</b>	<b>10,639</b>	<b>11,157</b>	<b>1,979</b>	<b>21.6%</b>

\*The UC system reported they entered their data for Chemistry students twice, once under Chemistry and once under Other Physical Sciences. For that reason, data for UC Chemistry students are not included in Natural Sciences & Engineering and STEM totals, nor are the UC Chemistry data used in the computation of the percent of change due to UC.

**Table 2 – Number and Percent Change in the Annual Number of URM Graduate Student Enrollees in STEM Graduate Programs from 2000/01 to 2006/07 at Nine Campuses of the University of California\***

(The numbers in parentheses represent the number of institutions reporting data in the field.)

Enrollees Underrepresented Minorities UC only	Early AGEP Years 2000/01 to 2002/03	Mid-AGEP Years 2003/04 to 2005/06	Year 2006/07	Early AGEP to 2006/07 Change	Early AGEP to 2006/07 Percent Change
<b>All Natural Sciences &amp; Engineering (9)</b>	973	1,255	1,427	454	46.7%
Engineering (9)	237	319	325	88	37.1%
Computer Engineering					
Computer Sciences					
Chemistry (9)	106	143	153	47	44.3%
Other Physical Sciences (9)	170	232	237	67	39.4%
Earth, Atmospheric, Ocean					
Mathematics (9)	51	54	60	9	17.6%
Biological, Agricultural (9)	515	650	805	290	56.3%
Psychology (9)	85	92	90	5	5.9%
Interdisciplinary Sciences					
Economics					
Political Science					
Sociology					
Other Social Sciences (9)	514	578	369	-145	-28.2%
<b>All STEM Fields (9)</b>	1,572	1,925	1,886	314	20.0%

\* Some data cells do not contain information because UC did not report data in all categories. Also, the UC system reported they entered their data for Chemistry students twice, once under Chemistry and once under Other Physical Sciences. For that reason, data for UC Chemistry students are not included in Natural Sciences & Engineering and STEM totals, nor are the UC Chemistry data used in the computation of the percent of change due to UC.

**Table 3 – Percent Change in the Annual Number of URM Graduate Student Enrollees in STEM Graduate Programs from 2000/01 to 2006/07 Due to Nine Campuses of the University of California\***

URM Graduate Student Enrollees in Broad STEM Categories	Number Early AGEP to 2006/07 - Change at UC	Percent Early AGEP to 2006/07 - Change at UC	Number Early AGEP to 2006/07 Change at ALL AGEP Institutions	Percent Early AGEP to 2006/07 Change at ALL AGEP Institutions	Percent Early AGEP to 2006/07 Change Due to UC
<b>All Natural Sciences &amp; Engineering</b>	454	46.7%	1,696	28.6%	26.8%
Engineering	88	37.1%	598	28.0%	14.7%
Computer Engineering			4	2.3%	
Computer Sciences			69	15.4%	
Chemistry	47	44.3%	127	23.3%	37.0%
Other Physical Sciences	67	39.4%	142	35.8%	47.2%
Earth, Atmospheric, Ocean			70	41.2%	
Mathematics	9	17.6%	92	27.4%	9.8%
Biological, Agricultural	290	56.3%	641	35.1%	45/2%
Psychology	5	5.9%	138	15.9%	3.6%
Interdisciplinary Sciences			91	86.7%	
Economics			23	20.4%	
Political Science			-79	-21.6%	
Sociology			54	16.1%	
Other Social Sciences	-145	-28.2%	56	3.8%	-258.9%
<b>All STEM Fields</b>	314	20.0%	1,979	21.6%	15.9%

\* Some data cells do not contain information because UC did not report data in all categories. Also, the UC system reported they entered their data for Chemistry students twice, once under Chemistry and once under Other Physical Sciences. For that reason, data for UC Chemistry students are not included in Natural Sciences & Engineering and STEM totals, nor are the UC Chemistry data used in the computation of the percent of change due to UC.

**Table 4 – Number and Percent Change in the Annual Number of All Other U.S. or Permanent Resident Graduate Student Enrollees in STEM Graduate Programs at AGEP Institutions and Percent Change in the Annual Number of URM Graduate Student Enrollees from 2000/01 to 2006/07 (N= 67 Institutions)\***

(The numbers in parentheses represent the number of institutions reporting data in the field.)

Enrollees Other US (All)	Early AGEP Years 2000/01 to 2002/03	Mid-AGEP Years 2003/04 to 2005/06	Year 2006/07	Early AGEP to 2006/07 Change	Early AGEP to 2006/07 Percent Change All Other U.S. Students	Early AGEP to 2006/07 Percent Change URM
<b>All Natural Sciences &amp; Engineering (67)</b>	49,189	55,084	56,901	7,712	15.7%	28.6%
Engineering (62)	16,341	18,947	19,296	2,955	18.1%	28.0%
Computer Engineering (25)	1,162	1,243	1,182	20	1.7%	2.3%
Computer Sciences (48)	3,514	3,961	3,742	228	6.5%	15.4%
Chemistry (62)	3,804	4,264	4,509	705	18.5%	23.3%
Other Physical Sciences (61)	4,061	4,737	4,945	884	21.8%	35.8%
Earth, Atmospheric, Ocean (45)	2,265	2,479	2,640	375	16.6%	41.2%
Mathematics (63)	2,486	3,129	3,366	880	35.4%	27.4%
Biological, Agricultural (65)	16,594	17,516	18,533	1,939	11.7%	35.1%
Psychology (54)	4,429	4,798	4,947	518	11.7%	15.9%
Interdisciplinary Sciences (24)	719	793	959	240	33.4%	86.7%
Economics (32)	868	971	1,006	138	15.9%	20.4%
Political Science (31)	1,463	1,585	1,669	206	14.1%	-21.6%
Sociology (31)	1,296	1,385	1,479	183	14.1%	16.1%
Other Social Sciences (40)	8,830	9,633	8,481	-349	-4.0%	3.8%
<b>All STEM Fields (67)</b>	<b>66,794</b>	<b>74,249</b>	<b>75,442</b>	<b>8,648</b>	<b>12.9%</b>	<b>21.6%</b>

\* Some data cells do not contain information because UC did not report data in all categories. Also, the UC system reported they entered their data for Chemistry students twice, once under Chemistry and once under Other Physical Sciences. For that reason, data for UC Chemistry students are not included in Natural Sciences & Engineering and STEM totals, nor are the UC Chemistry data used in the computation of the percent of change due to UC.

Other U.S. citizens and permanent residents does not include African Americans, Hispanic Americans, and Native Americans.

**Table 5 – Number and Percent Change in Annual Number of All Other U.S Citizen or Permanent Resident Graduate Student Enrollees in STEM & Percent Changes in URM Graduate Student Enrollees at Nine Campuses of the University of California from 2000/01 to 2006/07\***

(The numbers in parentheses represent the number of institutions reporting data in the field.)

Enrollees Other US UC only	Early AGEP Years 2000/01 to 2002/03	Mid-AGEP Years 2003/04 to 2005/06	Year 2006/07	Early AGEP to 2006/07 Change	Early AGEP to 2006/07 Percent Change All Other U.S. Students	Early AGEP to 2006/07 Percent Change URM
<b>All Natural Sciences &amp; Engineering (9)</b>	10,974	12,702	13,295	2,321	21.1%	46.7%
Engineering (9)	3,226	4,048	4,039	813	25.2%	37.1%
Computer Engineering						
Computer Sciences						
Chemistry (9)	1,038	1,192	1,312	274	26.4%	44.3%
Other Physical Sciences (9)	2,085	2,457	2,576	491	23.5%	39.4%
Earth, Atmospheric, Ocean						
Mathematics (9)	554	645	706	152	27.4%	17.6%
Biological, Agricultural (9)	5,109	5,552	5,974	865	16.9%	56.3%
Psychology (9)	571	653	687	116	20.3%	5.9%
Interdisciplinary Sciences						
Economics						
Political Science						
Sociology						
Other Social Sciences (9)	2,729	2,957	1,512	-1,217	-44.6%	-28.2%
<b>All STEM Fields (9)</b>	14,274	16,312	15,494	1,220	8.5%	20.0%

\* Some data cells do not contain information because UC did not report data in all categories. Also, the UC system reported they entered their data for Chemistry students twice, once under Chemistry and once under Other Physical Sciences. For that reason, data for UC Chemistry students are not included in Natural Sciences & Engineering and STEM totals, nor are the UC Chemistry data used in the computation of the percent of change due to UC.

Other U.S. citizens and permanent residents does not include African Americans, Hispanic Americans, and Native Americans.

### **About Data Collection and Analysis of URM Graduate Student Enrollees in STEM Graduate Programs at AGEP Institutions (2000/01 to 2006/07)**

To examine changes in the annual number URM graduate student enrollees in STEM graduate programs from 2000/01 to 2006/07, data was collected from 67 AGEP institutions representing 21 Alliances. Between July 2007 and February 2008, 67 AGEP institutions submitted data on URM and other U.S. citizens and permanent resident new enrollees in STEM graduate programs for at least one category of STEM fields. To reduce the volatility of the annual data, the data were grouped into three categories:

- Early AGEP Years (2000/01 to 2002/03);
- Mid-AGEP Years (2003/04 to 2005/06); and
- 2006/07.

Also, data were collected and analyzed by race/ethnicity, gender, and citizenship for the following fields:

- (a) Biological & Agricultural Sciences
- (b) Chemistry
- (c) Computer Engineering
- (d) Computer Sciences
- (e) Earth, Atmospheric, and Ocean Sciences (including Geosciences, Environmental Sciences)
- (f) Economics
- (g) Engineering (including Electrical Engineering; excluding Computer Engineering)
- (h) Interdisciplinary Sciences
- (i) Mathematics (including Mathematical Statistics)
- (j) Other Physical Sciences (including Astronomy, Physics)
- (k) Other Social Sciences
- (l) Political Science
- (m) Psychology (excluding Clinical Psychology)
- (n) Sociology