President's Council of Advisors on Science and Technology (PCAST)

Recommendations:
1. Catalyze widespread adoption of empirically validated teaching practices.
2. Advocate and provide support for replacing standard laboratory courses with discovery-based research courses.
3. Launch a national experiment in postsecondary mathematics education to address the mathematics-preparation gap.
4. Encourage partnerships about stakeholders to diversify pathways to STEM careers.
I. National Trends in Enrollments

II. What we have learned about mainstream Calculus I

III. Fairweather and ASU Reports
I. National Trends in Enrollments
   a. STEM graduation rates
   b. Enrollments of underrepresented groups
   c. Trends in intended STEM majors
   d. Calculus enrollments
Figure 1. Recent and Projected Growth in STEM and Non-STEM Employment


US Department of Commerce, Economics and Statistics Administration
STEM: Good Jobs Now and for the Future, July 2011
Figure 2. Regression-based Hourly Earnings Premiums for STEM Workers 1994—2010

Note: The estimates are for private wage and salary workers age 25 and over.
Math-intensive majors as % of Bachelors Degrees

- Engineering
- Physical Science
- Math & Stat
Math-intensive Bachelor's degrees relative to number of 22 year-olds (degrees ÷ # of 22-year olds)

- Engineering
- Physical Science
- Math & Stat

NCES & US Census data
There were 1,089 Bachelors in Math or Stat earned by African-Americans in 1997. By 2010, that number was down to 854.
Math & Stats Majors by Gender

<table>
<thead>
<tr>
<th>Year</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>7500</td>
<td>6000</td>
</tr>
<tr>
<td>1992</td>
<td>7000</td>
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</tr>
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<td>1994</td>
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<td>2004</td>
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<td>9500</td>
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<td>2006</td>
<td>3500</td>
<td>10000</td>
</tr>
<tr>
<td>2008</td>
<td>3000</td>
<td>10500</td>
</tr>
<tr>
<td>2010</td>
<td>2500</td>
<td>11000</td>
</tr>
</tbody>
</table>

NCES data
Fall 2011: 240,000 students entered four-year undergraduate programs intending to major in engineering, a physical science, mathematics, or statistics.

An additional 300,000 are enrolled in one of these programs in a two-year college.

In 2010, we graduated 112,000 students with a Bachelor’s degree in one of these disciplines.
Biological Sciences

- Intended majors
- Actual majors

The graph shows the trend in biological sciences majors from 1980 to 2010, with a significant increase in the number of actual majors from 2008 onwards.
Physical Sciences

![Graph showing the number of intended and actual majors in Physical Sciences from 1980 to 2010. The graph indicates a steady increase in actual majors, while the intended majors show some fluctuations but remain higher than the actual ones in most years.](image-url)
Increase over the period 2005 to 2010 in entering freshman class intending to major in

<table>
<thead>
<tr>
<th>Discipline</th>
<th>2005</th>
<th>2010</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>108,000</td>
<td>156,000</td>
<td>44%</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>99,000</td>
<td>165,000</td>
<td>67%</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>30,000</td>
<td>41,000</td>
<td>37%</td>
</tr>
<tr>
<td>Mathematical Sciences</td>
<td>10,400</td>
<td>13,600</td>
<td>31%</td>
</tr>
<tr>
<td><strong>Totals (including Comp Sci)</strong></td>
<td><strong>261,000</strong></td>
<td><strong>390,000</strong></td>
<td><strong>49%</strong></td>
</tr>
</tbody>
</table>
Total enrollments in Post-Secondary Mainstream Calculus (thousands)

- Calculus I: 19% increase
- Calculus II: 51% increase
- Calculus III & IV: 40% increase
Over 600,000 students are studying calculus in high school this year, over 1/3 of the 1.8 million who will go directly from HS to college.