Issues of the Transition to College Calculus

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Two-year Colleges
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PowerPoint available at
www.macalester.edu/~bressoud/talks
1. Data on graduation rates in math-intensive majors.

2. Data on high school and college mathematics enrollments.

3. The effect of calculus in high school.

4. What needs to change in our colleges and universities.
Remarks by President Obama at the National Academy of Sciences, April, 2009:

“… our work does not end with a high school diploma. For decades, we led the world in educational attainment, and as a consequence we led the world in economic growth … But in this new economy, we've come to trail other nations in graduation rates, in educational achievement, and in the production of scientists and engineers.”
Women as % of Selected Degrees

- All bachelor's degrees
- Engineering
- Mathematics
- Physical Science

NCES data
Hispanic students as % of Bachelors Degrees in selected fields

NCES data
There were 1,089 Bachelors in Math or Stat earned by African-Americans in 1997. By 2008, that number was down to 818.
In the Fall of 2010: 210,000 students entered four-year undergraduate programs with the intention of majoring in engineering, a physical science, mathematics, or statistics.

About half will succeed.

Over 600,000 of the entering students had passed a class in calculus while in high school.

NCES 2007-312
Over 600,000 students studied calculus in high school this year, roughly 1/3 of the 1.8 million who will go directly from HS to college.

Slightly over 150,000 of these students earned and used credit for Calculus I.
45% increase in 2-year college enrollments during this time

Fall enrollments (thousands) in 2-year undergraduate programs

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CBMS data
43% increase in 4-year college enrollments during this time

CBMS data
Fall enrollments (thousands), Calculus and above, 4-year undergraduate programs

CBMS data
Fall enrollments, Calculus and above, as percentage of 20–24 year-olds

Increasingly, the students who do not have to take mathematics in college, don’t.
Of students who took pre-calculus and
• Their declared major required at least one semester of calculus, and
• They earned an A in pre-calculus,

43% chose not to enroll in calculus.
During the period fall 2001 through fall 2006, 43% of engineering majors, 54% of mathematics majors, 51% of physical science majors, and 50% of technology majors who enrolled in Calculus I at ASU and whose intended majors required Calculus II never earned credit for Calculus II.

The point is that ASU gathered this information, and they are now doing something about it.
SOLUTIONS: Improve first-year college mathematics

Use online resources to address individual student weaknesses.
SOLUTIONS: Improve first-year college mathematics

mathematical and theoretical biology institute

MTBI supports the development of students through educational, research and mentorship activities from the undergraduate to the postdoctoral level.

Carlos Castillo-Chavez
“The mathematics profession as a whole has seriously underestimated the difficulty of teaching mathematics.”

Ramesh Gangolli
MER Workshop
May 31, 1991

With thanks to Susanna Epp for preserving this quote.

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