

Educational Challenges for the MAA

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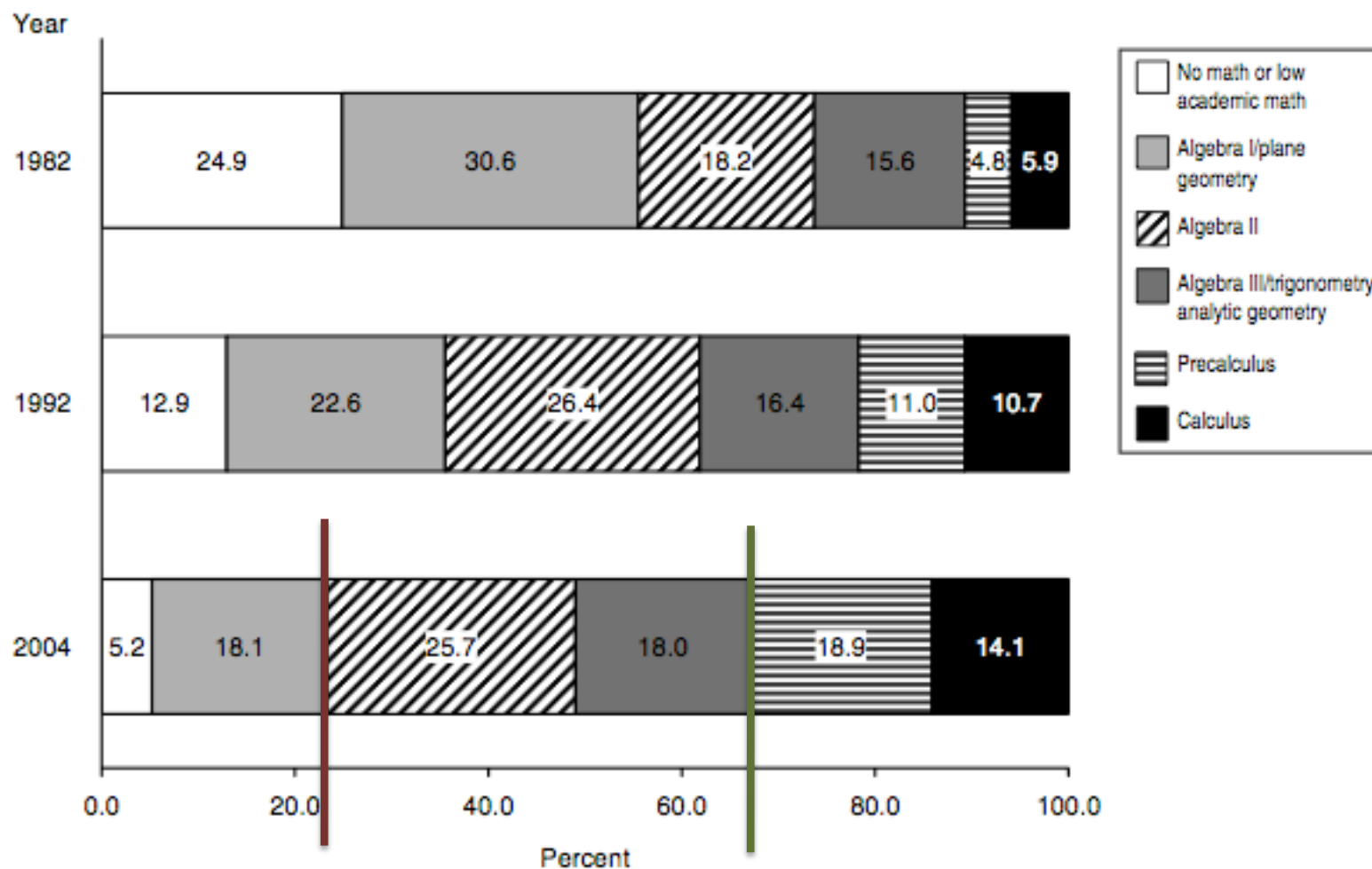


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Strategic Planning Group on STEM (Science, Technology, Engineering, and Mathematics) Issues and the Undergraduate Program

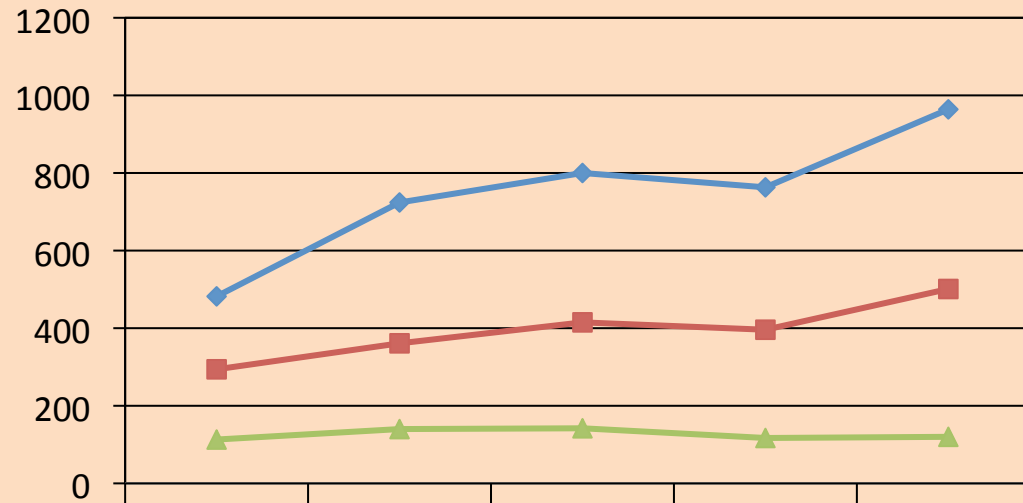
1. Communication with members
2. Transitions (HS to college, 2- to 4-year, to upper division, to grad school)
3. Strengthening the Major
4. Teacher Preparation and In-service Education
5. Assessment and Accountability
6. Strengthening connections to other disciplines
7. Research Experiences for Undergraduates
8. Effective Use of Technology

Figure 1. Percentage of high school graduates who completed different levels of mathematics courses: 1982, 1992, and 2004



Advanced Mathematics and Science Coursetaking in the Spring High School Senior Classes of 1982, 1992, and 2004. NCES 2007-312

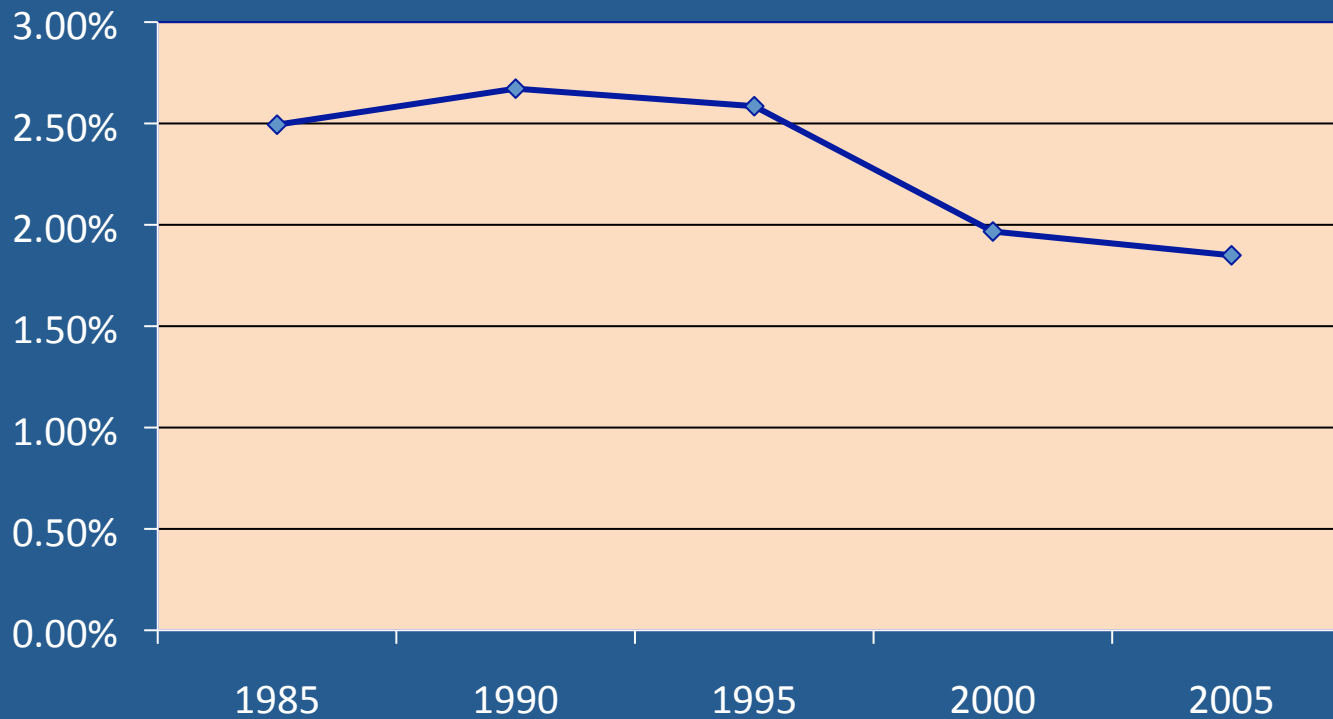
Fall enrollments (thousands) in 2-year undergraduate programs



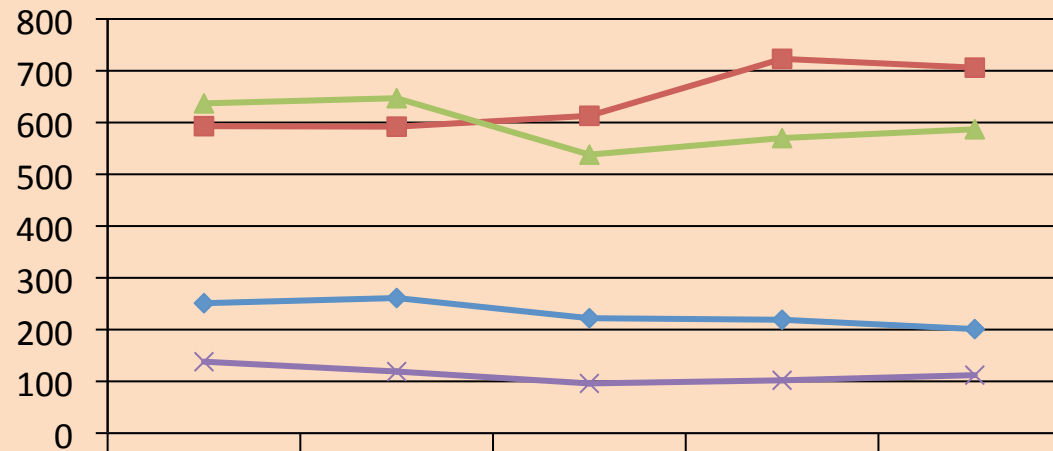
◆ precollege	482	724	800	763	964
■ introductory	294	361	415	396	501
▲ calc & advanced	113	140	142	117	120

45% increase in 2-year college enrollments during this time

Percentage of students in 2-year undergraduate programs enrolled in mathematics at level of calculus or above



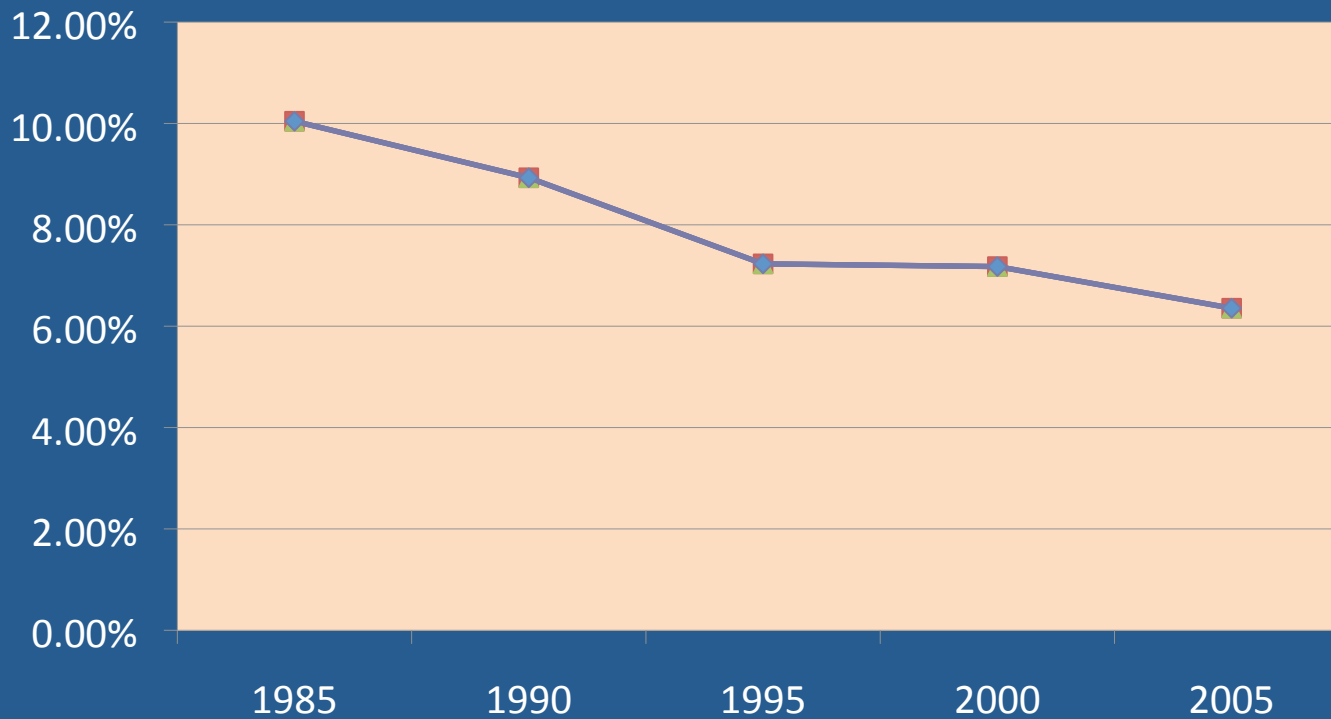
Fall enrollments (thousands) in 4-year undergraduate programs



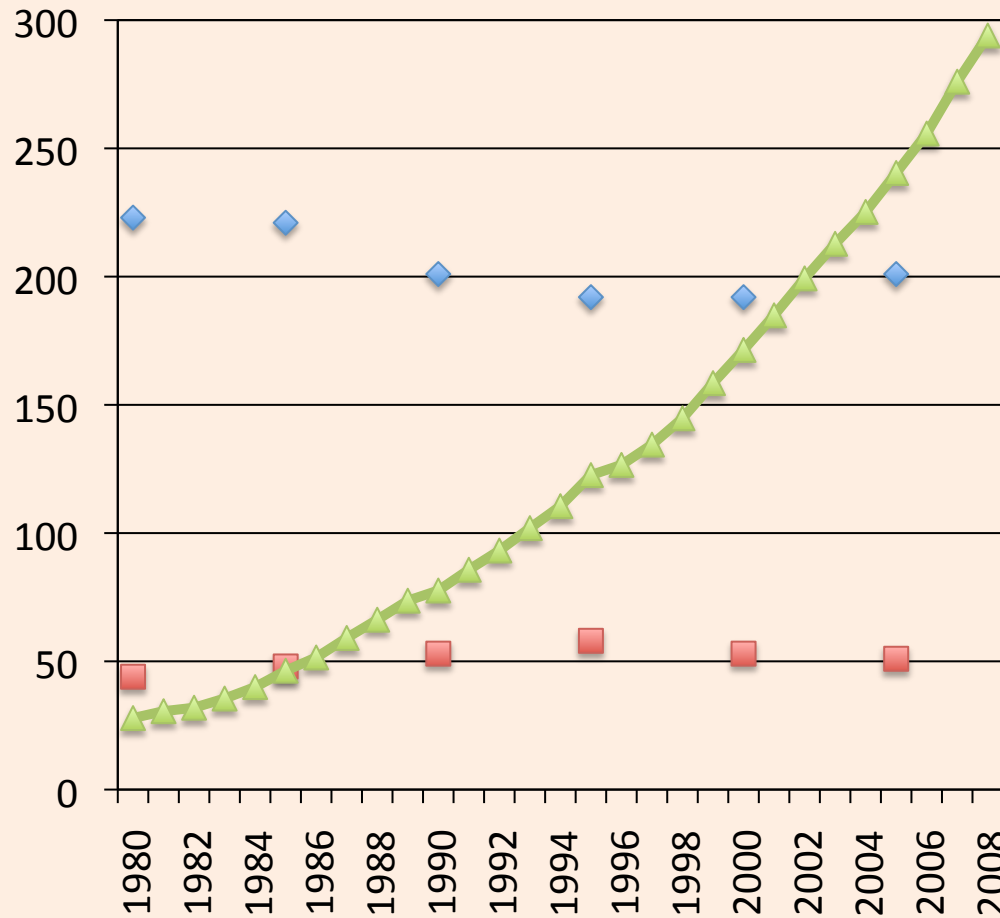
	1985	1990	1995	2000	2005
◆ precollege	251	261	222	219	201
■ introductory	593	592	613	723	706
▲ calculus level	637	647	538	570	587
✕ advanced	138	119	96	102	112

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

Percentage of students in 4-year undergraduate programs enrolled in mathematics at level of calculus or above



Fall Enrollments in Calculus I versus AP Calculus Exams (thousands)



500,000–600,000 students study calculus in high school each year.
160,000–200,000 earn college credit for this course.

- ◆ 4-year colleges
- 2-year colleges
- ▲ AP exams (AB & BC)

Of the high school students who graduated in 1992 and studied “calculus” while in high school, 31% took *precalculus* in college, and another 32% took *no calculus* in college.

From the transcript analysis of the National Education Longitudinal Study begun in 1988.

AP Calculus AB has a much broader syllabus than the typical Calculus I.

About $\frac{1}{3}$ of students do well enough to be ready for Calculus II or higher.

Remainder (300,000–400,000) run into problems when entering the college curriculum.

Challenges: We need much more information about what happens to the students who study calculus in high school when they get to college, more effective means of keeping them interested in mathematics, and courses that recognize their strengths while addressing their weaknesses.

We need a better understanding of what works in college calculus and how we can use it to attract and prepare students.

We need to develop and promote courses that attract students from disciplines other than engineering and the physical sciences and that prepare them for further work in mathematics.

MAA Proposal to NSF:

Characteristics of Successful Programs in College Calculus.

1. To improve our understanding of the demographics of students who enroll in calculus,
2. To measure the impact of the various characteristics of calculus classes that are believed to influence student success,
3. To conduct explanatory case study analysis of exemplary programs in order to identify why and how these programs succeed.

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

Ramesh Gangolli
MER Workshop
May 31, 1991

The MAA is here to help.

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