Notable Trends in Two-Year College Data

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Conference Board of the Mathematical Sciences

CBMS2015
Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States

Website under construction:
http://www.ams.org/profession/data/cbms-survey/cbms2015-work
What is CBMS2015?

Every five years since 1965, a comprehensive study of undergraduate programs in the mathematical sciences in the United States has been undertaken under the auspices of the Conference Board of the Mathematical Sciences (CBMS).

Funding from the National Science Foundation and support from the mathematical sciences professional societies.
The Two-Year College Team......

Thanks to the Two-Year College CBMS2010 Team:

Rob Farinelli, College of Southern Maryland, MD
Rob Kimball, Wake Technical C, NC
John C. Peterson, Chattanooga State CC, TN
Linda Zientek, Sam Houston College, TX
What is CBMS2015?

A stratified random sample of 518 institutions was selected for the 2015 survey from the roughly 2400 public two-year (public or private) AND four-year institutions that have undergraduate programs in mathematics or statistics.
Two-Year College Sample

Stratified random sample of 222 colleges selected from a sample frame of 1,030 public two-year colleges.

The survey return rate was 119 surveys returned or 54% of the sample.

Thanks to those of you who completed the survey.
URL for Chapters and Tables

The drafts of the chapters and tables are available online at http://www.ams.org/cbms/cbms-survey/cbms2015-work

Data tables and chapters are being finalized. The final PDF and printed version should be available in Spring 2018.
Estimates and Standard Error

- The data are estimates computed using the responses to the questionnaires.
- The standard errors for all CBMS2015 tables can be found in Appendix VII.
Take the Quiz!

1. How many students were enrolled in two-year colleges in fall 2015? (nearest 1000s)

2. How many students were enrolled in four-year institutions in fall 2015? (nearest 1000s)
## Total Enrollment:
**TYC: 6,216,000**  
**FYC: 10,546,000**

**TABLE S.1** Enrollment in (1000s). NCES data on total fall enrollments in two-year colleges and four-year colleges and universities in fall 2000, 2005, 2010, and 2015. NCES data includes both public and private four-year colleges and universities, and includes only public two-year colleges. **Enrollments include distance learning enrollments, but not dual enrollments.**

<table>
<thead>
<tr>
<th>Four-Year College &amp; Univ.</th>
<th>Two-Year College</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCES Total Fall Undergraduate Enrollments</td>
<td>7207</td>
</tr>
</tbody>
</table>

11/21/2017
Total Enrollment:
TYC: 6,216,000  FYC: 10,546,000

TABLE S.1  Enrollment in (1000s). NCES data on total fall enrollments in two-year colleges and universities for fall 2000, 2005, 2010, and 2015. NCES data includes both public and private four-year colleges and universities, and includes only public two-year colleges. Enrollments include distance learning enrollments, but not dual enrollments.

TYC institutional enrollment decreased by 14%!
FYC up 1%!
Take the Quiz!

3. How many students were enrolled in **mathematics courses** in **two-year** colleges in fall 2015? (nearest 1000s)

4. How many students were enrolled in **mathematics, statistics, and computer science courses** in **four-year institutions** in fall 2015? (nearest 1000s)
FIGURE S.1.1  Combined enrollment (in 1000s) in undergraduate mathematics, statistics, and computer science courses at four-year colleges and universities and mathematics departments and statistics departments, and in mathematics programs of two-year colleges: Fall 2000, 2005, 2010, and 2015. Data for 2005 include only public two-year colleges. **Data does not include dual enrollment (94,000), includes Computer Science and Stat Depts.**
FIGURE S.1.1 Combined enrollment (in 1000s) in undergraduate mathematics, statistics, and computer science courses at four-year colleges and universities and mathematics departments and statistics departments, and in mathematics programs of two-year colleges: Fall 2000, 2005, 2010, and 2015. Data for 2005 include only public two-year colleges. Data does not include dual enrollment.

Mathematics Enrollment:
TYC: 1,918,000
FYC: 2,738,000
SE: 114,000
SE: 161,000

TYC mathematics enrollments decreased by 4%!
FIGURE S.1.1  Combined enrollment (in 1000s) in undergraduate mathematics, statistics, and computer science courses at four-year colleges and universities and mathematics departments and statistics departments, and in mathematics programs of two-year colleges: Fall 2000, 2005, 2010, and 2015. Data for 2005 include only public two-year colleges. Data does not include dual enrollment.

Mathematics Enrollment:
TYC: 1,918,000      FYC: 2,738,000
SE 114,000      SE 161,000

TYC mathematics enrollments were 41% of ALL post-secondary mathematics enrollments!
5. How many students were enrolled in distance learning courses in mathematics in two-year colleges (TYC) mathematics in fall 2015?
TYC 2015 Distance Learning Enrollment = 225,000

- 12\% of total mathematics enrollment
- Up 3\% compared with 2010 = 188,000
TYC 2015 Distance Learning Enrollment 225,000
(TYE.2 and 3 and 12)

- Arith/Pre-Alg down 18% to 9000
- Elem. Algebra up 3% to 38,000
- Interm. Algebra up 32% to 33,000
- Precalculus up 203% to 10,000
- Mainstream Calc I up 100% to 4,000
- Math Liberal Arts up 27% to 19,000
- Statistics up 35% to 31,000
6. How many students were enrolled in dual enrollment courses in mathematics in two-year colleges (TYC) mathematics in fall 2015?
TYC Dual Enrollment = 94,000

(TYE.2 and 3 and 12, and Table SP.16 (fall and spring))

• Up 16% from 2010 to 2015
• Compared with 93% increase 2005 to 2010
TYC Dual Enrollment = 94,000
(TYE.2 and 3 and 12, and Table SP.16 (fall and spring))

- College Algebra up 86% to 57,000
- Precalculus down 43% to 13,000
- Calculus down 42% to 6000
- Statistics up 66% to 7000
- Other down 15% to 10,000
TYC Enrollment Totaled 2,012,000
Including 94,000 Dual and 225,000 Distance Learning Enrollment

- Two-year Colleges
  - $1,918,000 + 94,000$ dual enrollment = $2,012,000$ (dual = 5% of total)

- Four-year Institutions
  - $2,738,000 + 69,000$ dual enrollment = $2,807,000$ (dual = 2% of total)
TYC Mathematics and Statistics Enrollment

FIGURE TYE.2.1 Enrollments in mathematics and statistics courses (no computer science) in mathematics programs in two-year colleges in fall 1985, 1990, 1995, 2000, 2005, 2010, and 2015. (Data for 2005, 2010, and 2015 include only public two-year colleges. 2015 data include 94,000 dual enrollments from Table SP.16 and 225,000 distance enrollments from Table TYE.12.)

2,012,000
(Includes 225,000 distance learning and 94,000 dual enrollment)
Total Mathematics Enrollment
(including dual enrollment and distance learning)

- TYC: 2,012,000 students
  - 4% decrease from 2010

- FYC: 2,807,000 students
  - 13% increase since 2010
Take the Quiz!

7. How many students were enrolled in **Precalculus mathematics courses** in two-year colleges in fall 2015? (nearest 1000s)

8. How many students were enrolled in **Calculus (mainstream and non-mainstream) courses** in two-year colleges in fall 2015? (nearest 1000s)
TYC Precollege Enrollment
(TYE.3 and 4)
(including distance enrollments, not including dual enrollment)

TYC Precollege enrollment = 782,000 students

Decrease of 32% since 2010!
TYC Precollege enrollments (TYE.3 and 4) (including distance enrollments, not including dual enrollment)

TYC Precollege enrollments = 782,000 students

TyC Precollege enrollment = 41% of all TyC math enrollment in 2015!
(Down from 57% in 2010!)
TYC Calculus Enrollment (TYE.3 and 4)
(including distance learning, but not including dual enrollment)

TYC Calculus enrollment = 152,000 students
TYC Calculus enrollment was 8% of all TYC math enrollment!
(Up 1% from 2010)
TYC Precalculus enrollment was 23% of all TYC math enrollment! (UP from 18% in 2010!)
## Enrollment Changes

(TYE.3.1 and TYE.3.2)

<table>
<thead>
<tr>
<th>Precollege level</th>
<th>2010</th>
<th>2015</th>
<th>% change 2015-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Arithmetic/Basic Math</td>
<td>146</td>
<td>71</td>
<td>-51.51%</td>
</tr>
<tr>
<td>2 Pre-algebra</td>
<td>226</td>
<td>127</td>
<td>-43.57%</td>
</tr>
<tr>
<td>3 Elementary Algebra</td>
<td>428</td>
<td>277</td>
<td>-35.27%</td>
</tr>
<tr>
<td>4 Intermediate Algebra</td>
<td>344</td>
<td>299</td>
<td>-13.23%</td>
</tr>
<tr>
<td>6 College Algebra</td>
<td>230</td>
<td>292</td>
<td>26.88%</td>
</tr>
<tr>
<td>7 Trigonometry</td>
<td>45</td>
<td>50</td>
<td>10.31%</td>
</tr>
<tr>
<td>8 College Algebra &amp; Trig</td>
<td>11</td>
<td>13</td>
<td>27.77%</td>
</tr>
<tr>
<td>10 Precalculus/Elem Func</td>
<td>64</td>
<td>87</td>
<td>34.89%</td>
</tr>
</tbody>
</table>
TYC Statistics and Probability Enrollment (TYE.3 and 4) (including distance learning, but not including dual enrollment)

TYC Statistics and Probability enrollment = 280,000 students

- Increase 104% from 2010 to 2015.
- 81% of Introductory Statistics is taught in TYCs.
- Up from 8% to 2010 to 15% of total TYC mathematics course enrollment!
Other Notable Course Enrollment Changes (TYE.3 and 4) (not including dual enrollment)

- Mathematics for Liberal Arts increased to 97,000 students (up 7%)
- Mathematics for Elementary Teachers decreased to 12,000 students (down 45%)
FIGURE TYE.4.1 Enrollment in 1000s (not including dual enrollments; including distance enrollments) in mathematics and statistics courses by type of course\(^1\) in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

\(^1\)For names of specific courses in each course grouping, see Table TYE.3.
First time in CBMS: Mathematics Pathways

1Pathways is defined to be a redesign of a mathematics sequence that provides students with an alternative course or sequence to/through developmental mathematics and to/through a college-level mathematics or statistics course.
## Implemented Pathways (TYE.11)

<table>
<thead>
<tr>
<th>Implemented a Pathways course sequence</th>
<th>Percentage</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes 58</td>
<td>No 42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall 2015</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Implemented Pathways course in:</th>
<th>Percentage</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Foundations</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>b. Quantitative Reasoning</td>
<td>59</td>
<td>41</td>
</tr>
<tr>
<td>c. Statistics</td>
<td>63</td>
<td>37</td>
</tr>
<tr>
<td>d. Other</td>
<td>32</td>
<td>68</td>
</tr>
</tbody>
</table>
9. What percent of sections of on campus mathematics courses were greater than 30 students at two-year colleges?
## On Campus Class Sizes

<table>
<thead>
<tr>
<th>Type of course</th>
<th>2010 Average section size</th>
<th>2010 Sections with size &gt; 30</th>
<th>2015 Average section size</th>
<th>2015 Sections with size &gt; 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precollege Level</td>
<td>24</td>
<td>20%</td>
<td>19.2</td>
<td>19%</td>
</tr>
<tr>
<td>Precalculus Level</td>
<td>26</td>
<td>34%</td>
<td>24.7</td>
<td>31%</td>
</tr>
<tr>
<td>Calculus Level</td>
<td>21</td>
<td>25%</td>
<td>25.4</td>
<td>34%</td>
</tr>
<tr>
<td>Elem. Statistics, Probability</td>
<td>28</td>
<td>38%</td>
<td>25.5</td>
<td>33%</td>
</tr>
<tr>
<td>Total, all courses</td>
<td>24</td>
<td>23%</td>
<td>21.7</td>
<td>25%</td>
</tr>
</tbody>
</table>
## Distance Learning Class Sizes

**Sections >30** *(TYE.7.1)*

<table>
<thead>
<tr>
<th>Type of course</th>
<th>2015 average section size</th>
<th>% of 2015 departments with average size &gt; 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precollege Level</td>
<td>22.6</td>
<td>18%</td>
</tr>
<tr>
<td>Precalculus Level</td>
<td>20.1</td>
<td>9%</td>
</tr>
<tr>
<td>Calculus Level</td>
<td>18.7</td>
<td>18%</td>
</tr>
<tr>
<td>Statistics, Probability</td>
<td>22.5</td>
<td>21%</td>
</tr>
<tr>
<td><strong>Total - all courses</strong></td>
<td><strong>20.7</strong></td>
<td><strong>17%</strong></td>
</tr>
</tbody>
</table>
Take the Quiz!

10. Percentage of two-year colleges that usually **required placements tests** for first-time enrollees in fall 2015?
## Placement Tests (TYE.13)

<table>
<thead>
<tr>
<th>A. Diagnostic or placement testing</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Colleges that usually require placement tests of first-time enrollees</td>
<td>97</td>
<td>100</td>
<td>78%</td>
</tr>
<tr>
<td>b. Colleges that periodically assess the effectiveness of their placement tests</td>
<td>81</td>
<td>75</td>
<td>79%</td>
</tr>
<tr>
<td>B. Advising by a member of the mathematics faculty</td>
<td>40</td>
<td>42</td>
<td>49%</td>
</tr>
</tbody>
</table>
Take the Quiz!

11. What was the number of full-time permanent mathematics faculty employed at two-year colleges in fall 2015?

12. What was the number of part-time mathematics faculty employed at two-year colleges in fall 2015?
TYC Full-time Faculty
(TYF.1 and TYF.16)

• Full-time permanent faculty = 8314 in 2015, down 15% (9790 in 2010)

• Full-time continuing faculty or other full-time faculty = 1487 in 2015, up 37% (1083 in 2010)
Total Full-time in 2015:
8314 + 1487 = 9801

(1073 less than in 2010)

- Downsizing faculty ages >59 yrs and < 30 yrs
- Largest group of faculty are 50-54 yrs old
Part-time faculty were 67% of all faculty in TYC in 2015! (70% in 2010)
Sections taught by full-time and part-time faculty

![Bar chart showing the proportion of sections taught by full-time and part-time faculty by type of course.]

**FIGURE TYE.9.1** Proportion of sections of mathematics and statistics courses taught by full-time and by part-time faculty in mathematics programs at public two-year colleges by type of course in fall 2015.

1For names of specific courses see Table TYE.3.
Sections taught by full-time and part-time faculty

36% of ALL mathematics sections are taught by part-time faculty!

46% of precollege sections
15% of mainstream calculus sections

FIG TYTE.9.1 Proportion of sections of mathematics and statistics courses taught by full-time and by part-time faculty in mathematics programs at public two-year colleges by type of course in fall 2015.

¹For names of specific courses see Table TYTE.3.
Ethnicity of Faculty  
(Table TYF.10 and 10.1)

FIGURE TYF.10.1 Number of ethnic minority full-time permanent faculty and number of all full-time permanent faculty in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.
23% of full-time mathematics faculty were ethnic minorities in 2015!

(1876 persons)
Largest groups: Asian/Pacific Islander, followed by African American and Hispanic
Lots of other information available in the survey........
Some examples of other tables

- Instructional Strategies *(TYE.10)*
- Highest Degree attained by faculty *(TYF.4)*
- Age and Gender of Faculty *(TYF.8 and 16)*
- Teacher Training *(SP.4)*
- Math Taught Outside of the Math Departments *(TYE.16)*
Discussion

13. How do you/would you or your college use this report and data?
Discussion

14. What other data would be useful to you?
CBMS 2020 is coming – You can help!

- Simplify/shorten
- Refine Instructional Strategies
- Special Projects?
- What else?

11/21/2017
More to come......

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Many thanks to Ellen Kirkman (Wake Forest U) and Jim Maxwell (AMS) and to CBMS.

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