



# The CBMS Survey

Measuring Characteristics and Dynamics of Undergraduate Mathematical and Statistical Science Programs in the US



# Panelists

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# The CBMS Surveys: Undergraduate Programs in the Mathematical Sciences

Every five years since 1965, on behalf of the Conference Board of the Mathematical Sciences (CBMS), with NSF support, recently administered by the American Mathematical Society (AMS), a committee appointed by CBMS has conducted a national survey of undergraduate mathematics and statistics programs. Reports include:

- Course Enrollments
- Faculty Demographics
- Degrees Awarded
- Program Features
- Topics of Current Interest
- Math departments in 2-year colleges (1,031)
- Math departments in 4-year colleges (1,395)
- Statistics departments (75)

<http://www.ams.org/profession/data/cbms-survey/cbms2015>



# Today's Agenda

**Pivoting:** Planned-for 2020 the Survey adapted into two parts:

- Winter 2021 report on departments' fall 2020 experiences from COVID-19
- Fall 2021 continuation of the larger longitudinal study begun decades ago

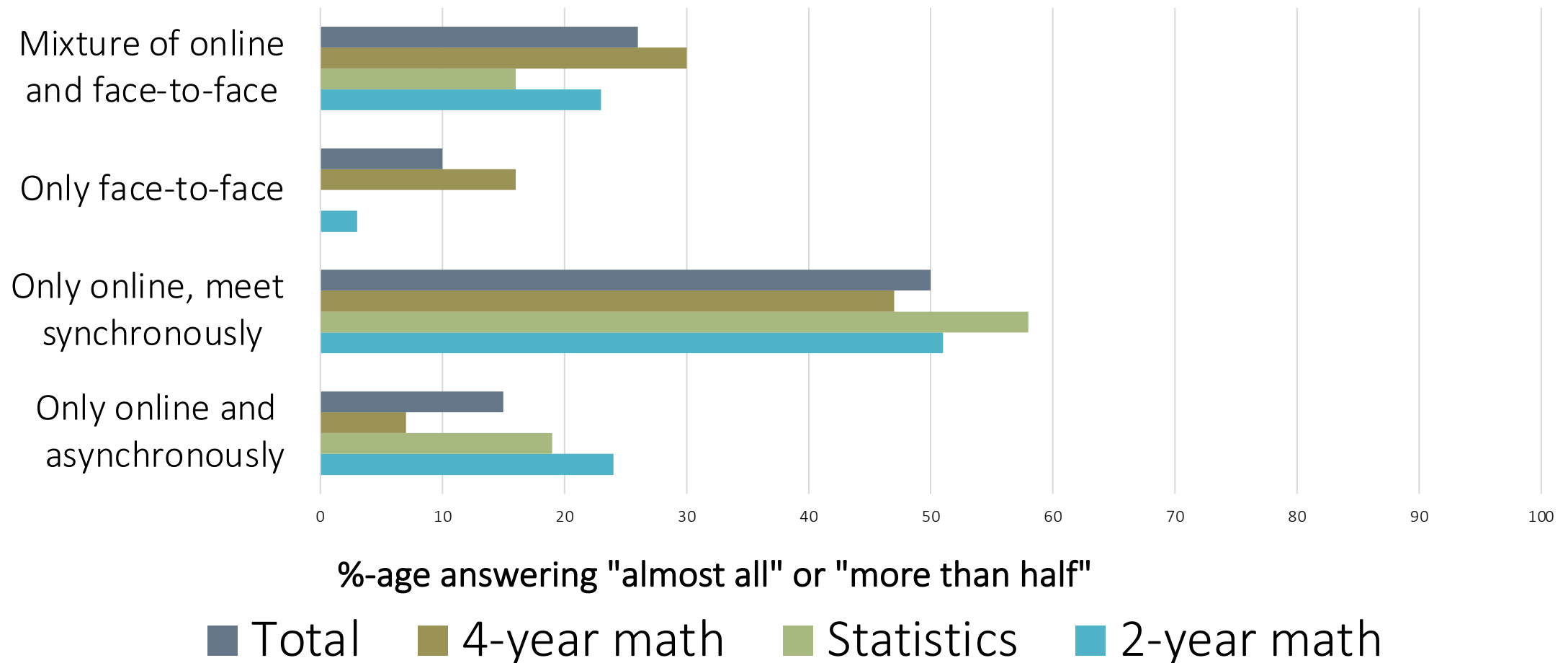
**Panelists will:**

- Share some of the COVID-19 survey findings
- Tell a data story or two emanating from 2015 and prior iterations
- Provide a look forward to the upcoming Survey and its follow-up

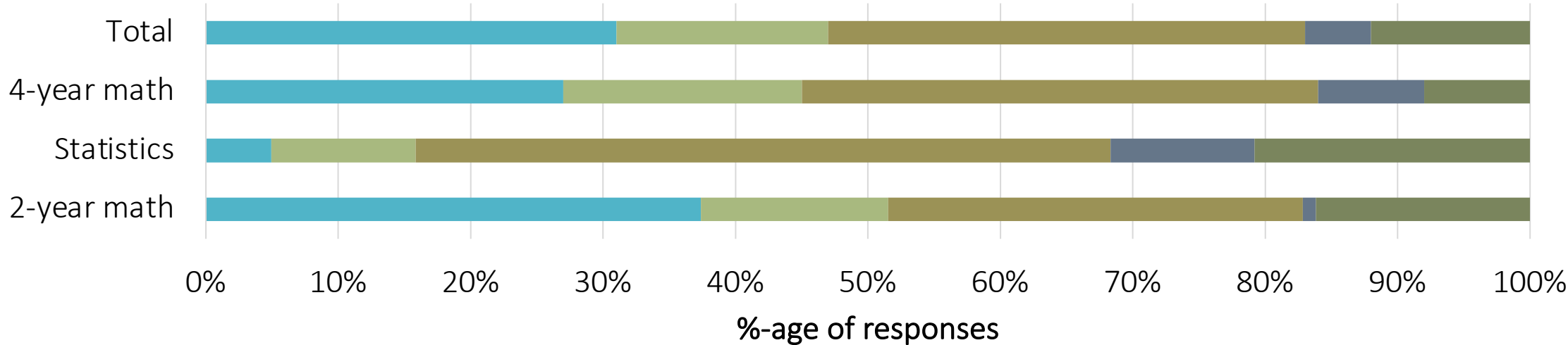
# COVID Survey—in the Eye of the Storm

- Conducted October – November 2020
- Six multiple-choice questions, request for enrollment fall 2019 and 2020, two free response
- Effectively a census of 855 2-year math, 85 4-year statistics, and 1,342 4-year math programs obtained from IPEDS
- Usable responses from 81 2-year math, 26 statistics, and 402 4-year math programs
- A sampling of findings....

# COVID: Class Format, by Department Type

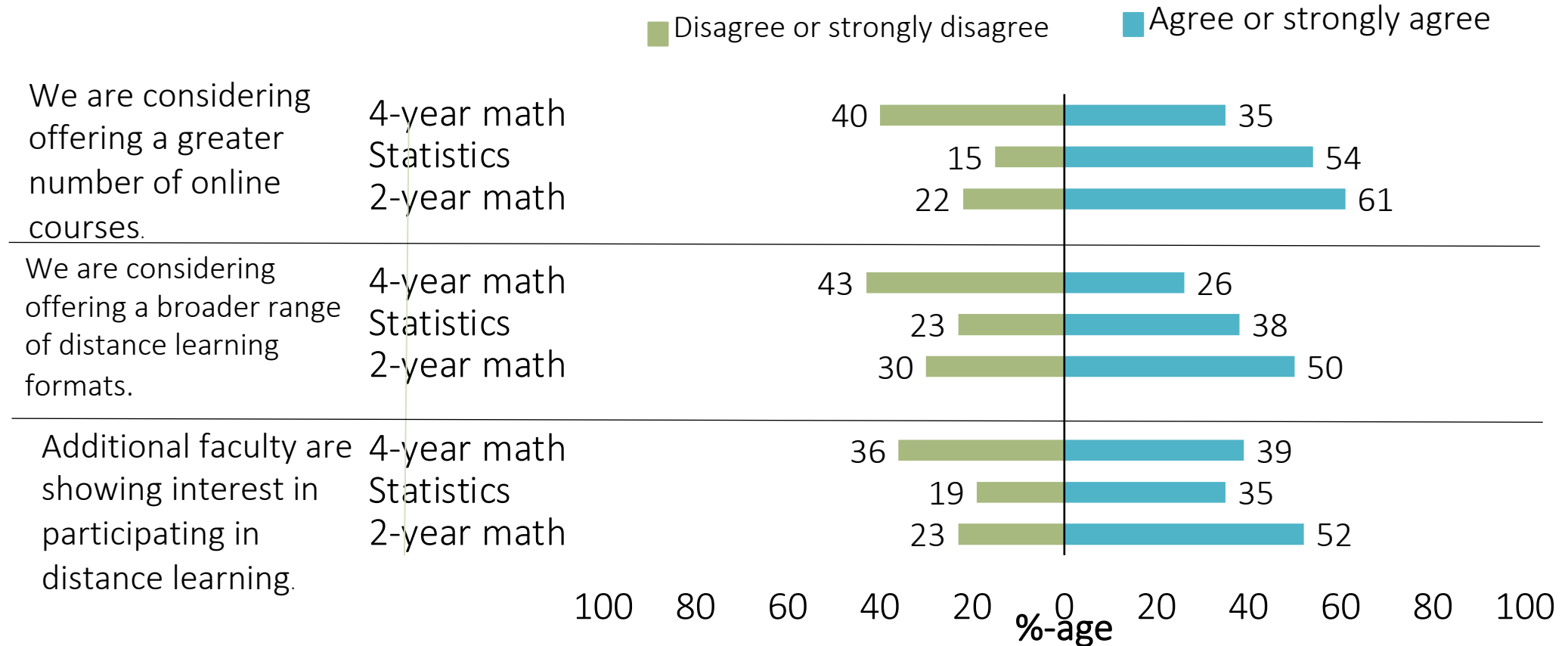


# COVID: Percentages of departments with various changes in fall enrollments from 2019 to 2020



■ Decrease of at least 10 percent    
 ■ Decrease of at least 5 but less than 10 percent    
 ■ Change (increase or decrease) of less than 5 percent    
 ■ Increase of at least 5 but less than 10 percent    
 ■ Increase of at least 10 percent

# COVID: Departments' Future Course-Delivery Planning





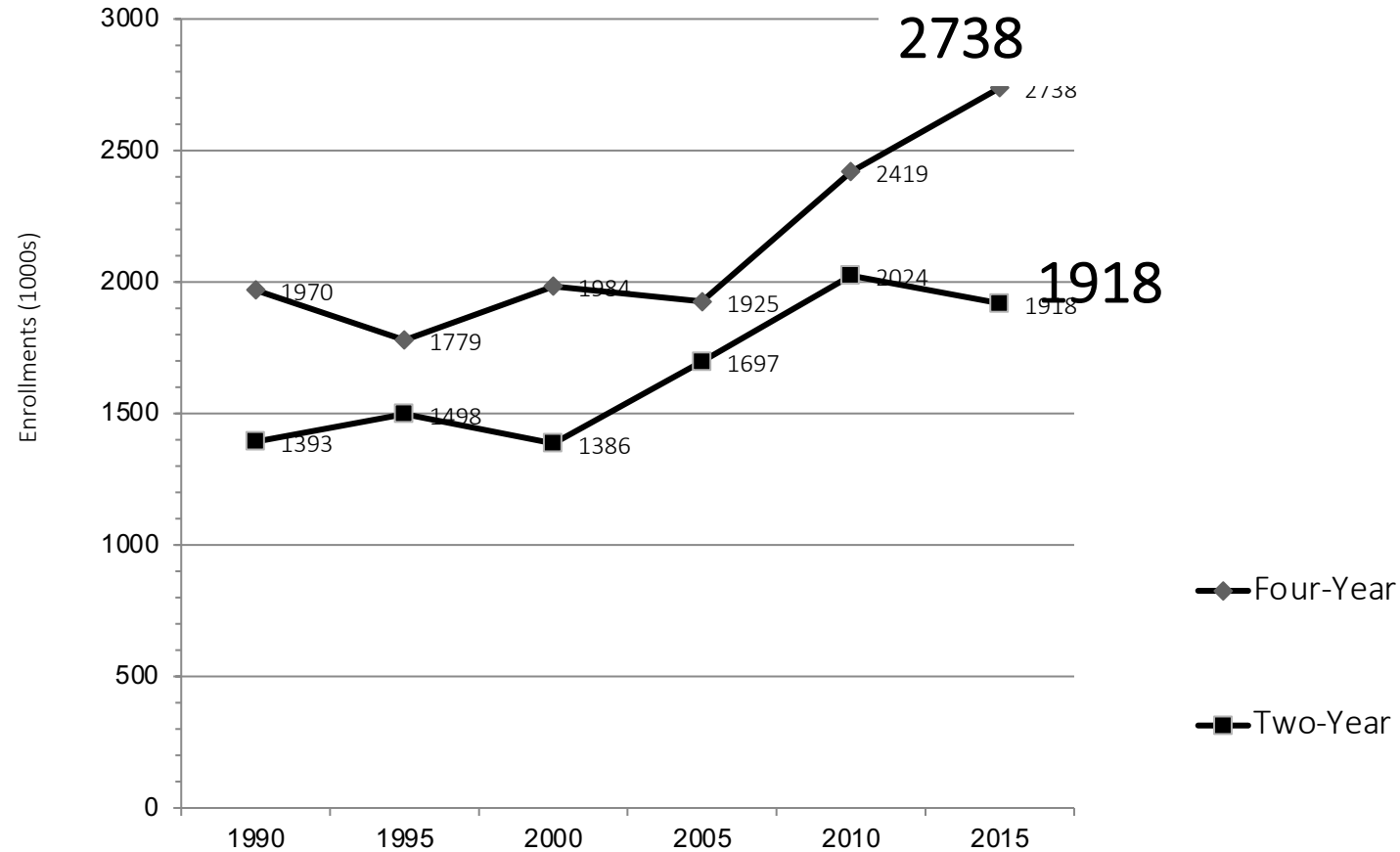
# 2015 CBMS Survey of Undergraduate Programs

- Conducted October – November 2015
- Stratified random sample of 518 institutions from among roughly 2,400 public 2-year colleges with mathematics programs and 4-year (public and private) colleges with mathematics or statistics programs
- Separate questionnaires to 2-year math, 4-year math, and 4-year statistics programs
- Here is a sampling of findings....

# Mathematical Sciences Enrollments

TYC: 1,918,000

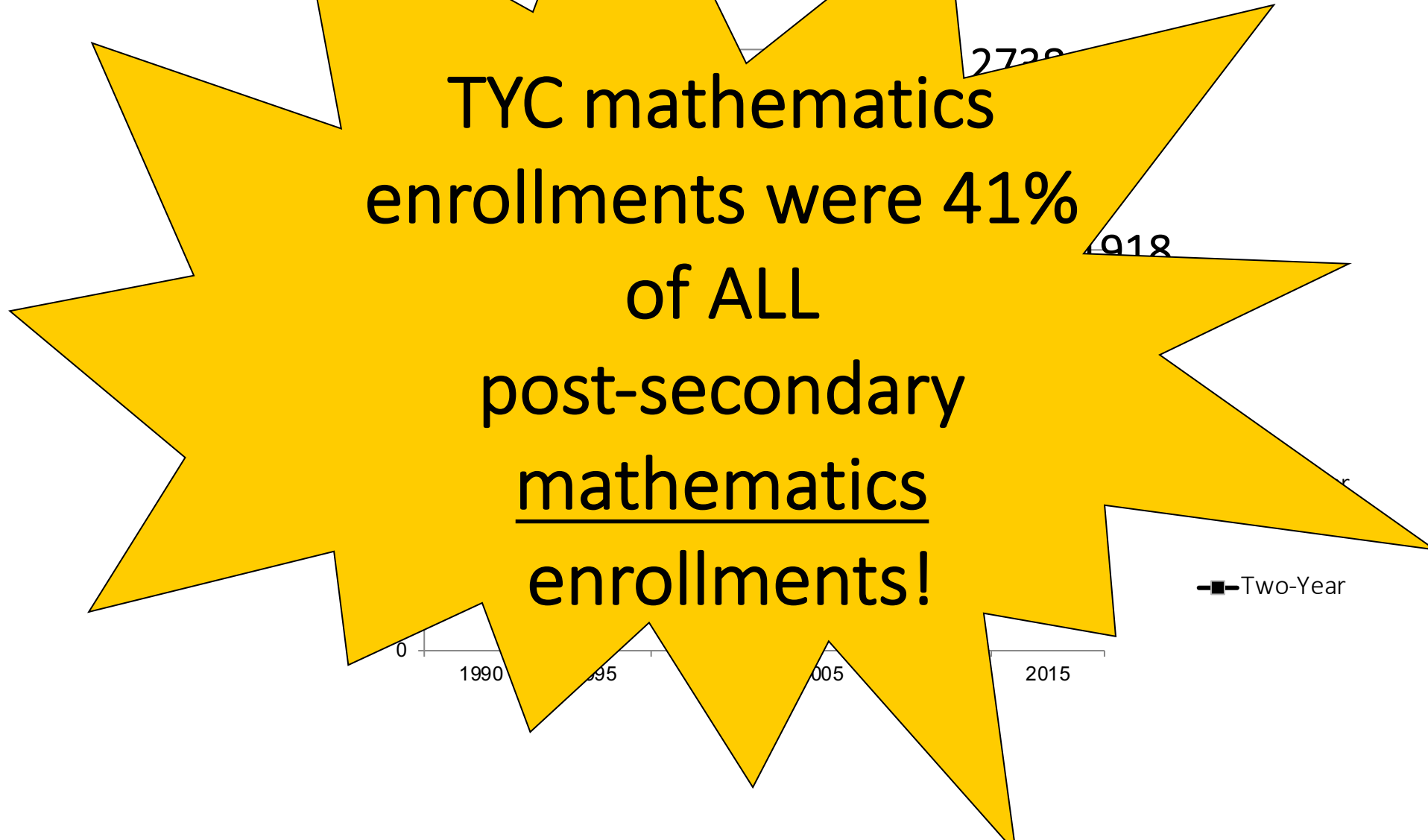
FYC: 2,738,000



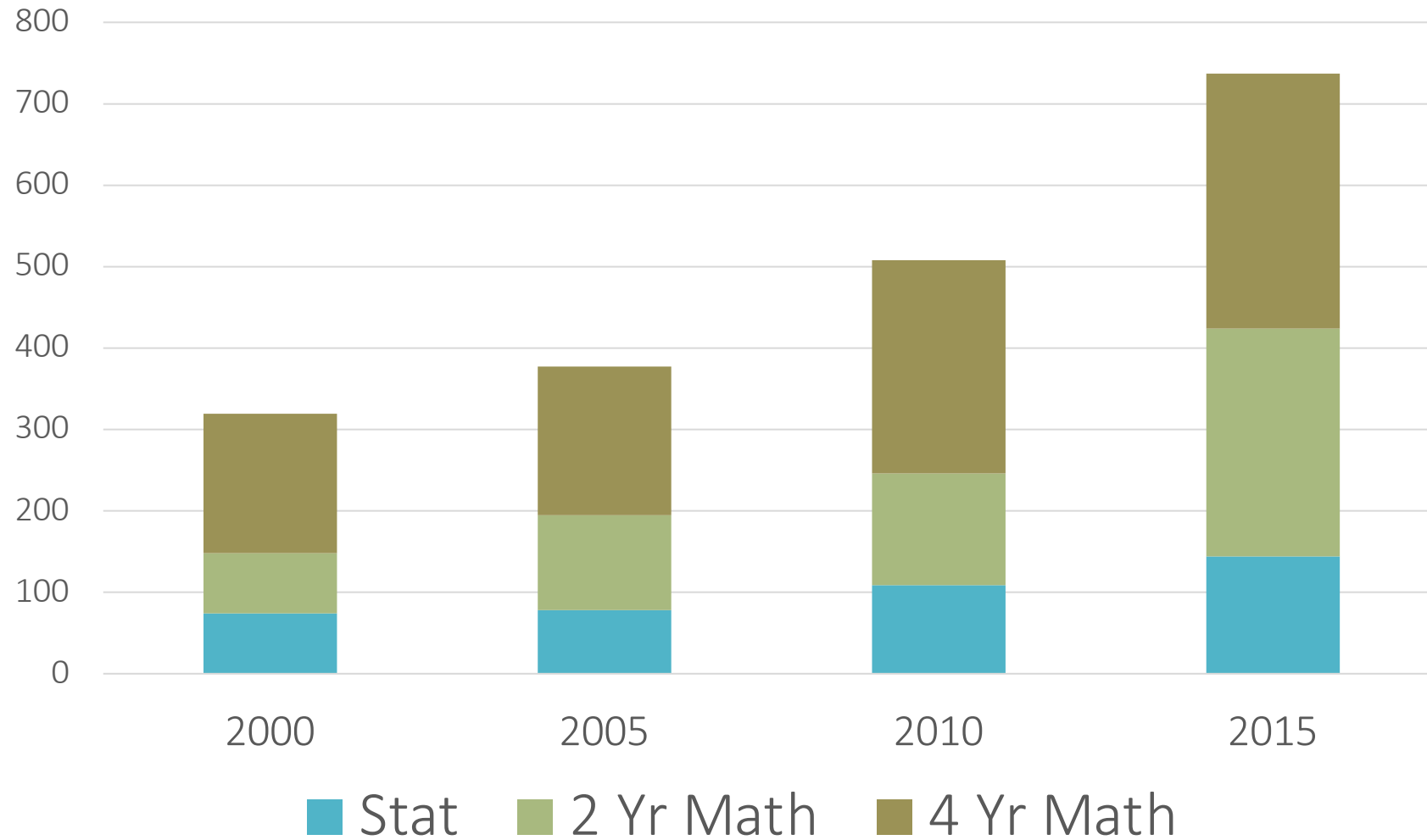
# Mathematical Sciences Enrollments

TYC: 1,918,000      FYC: 2,738,000

TYC mathematics enrollments were 41% of ALL post-secondary mathematics enrollments!



# Enrollments (1000s) in Statistics in Depts: Stat, 2-Year Math, 4-Year Math



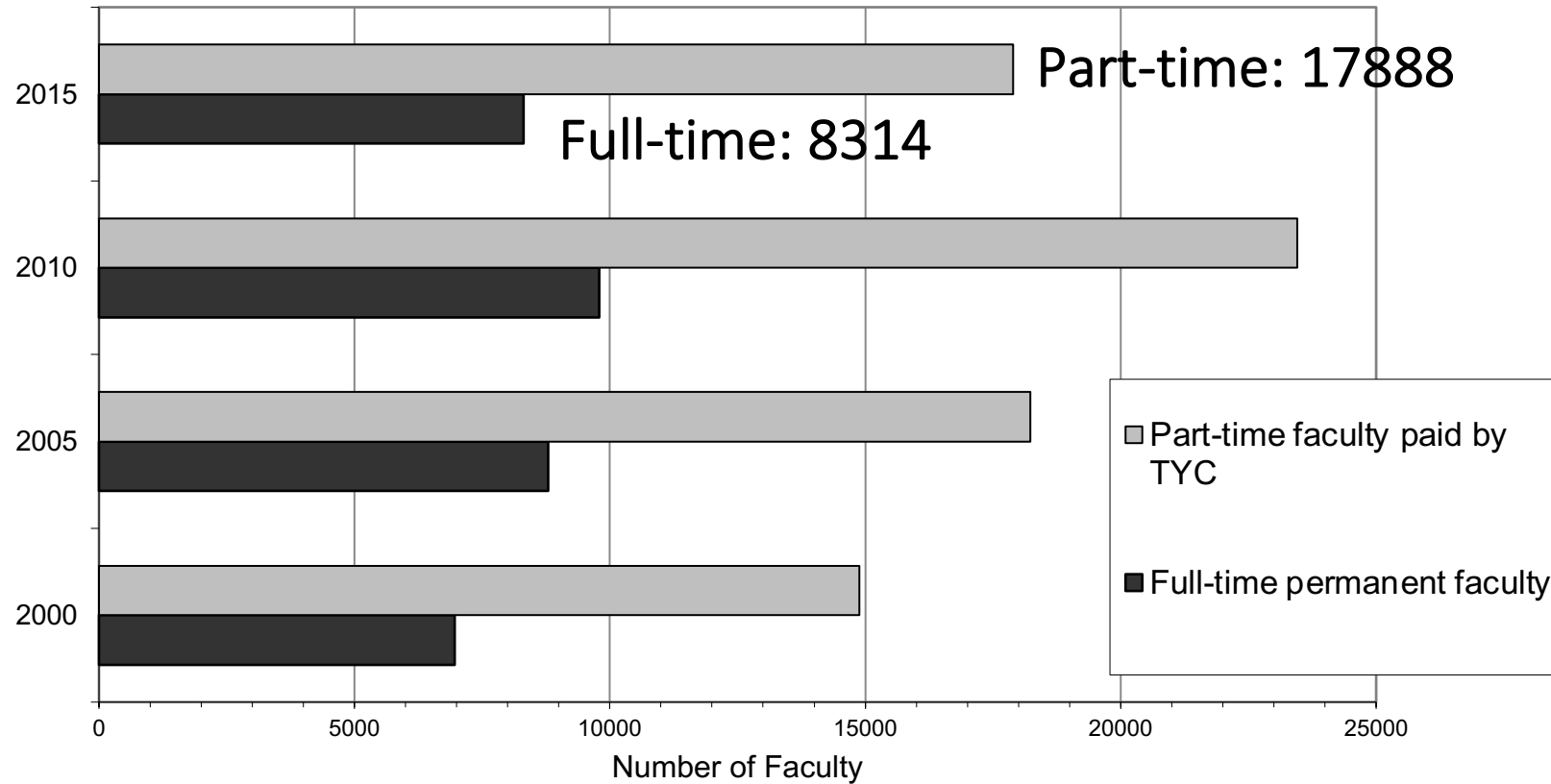
# First time in CBMS 2015: Pathways

“Pathways” is defined to be a single course or course sequence that enables students to complete a college-level gateway mathematics or statistics course that is aligned to students' academic and/or career goals within one academic year.

# Implemented Pathways in 2-year Colleges (TYE.11)

|  | Percentage |           | Enrollment       |
|--|------------|-----------|------------------|
|  | Yes        | No        |                  |
| Implemented a Pathways course sequence | 58         | 42        |                  |
|  |            |           | <b>Fall 2015</b> |
| Implemented Pathways course in:        |            |           |                  |
| a. Foundations                         | 51         | 49        | 76338            |
| b. Quantitative Reasoning              | 59         | 41        | 45203            |
| <b>c. Statistics</b>                   | <b>63</b>  | <b>37</b> | <b>56342</b>     |
| d. Other                               | 32         | 68        | 14631            |

# TYC Full-Time Permanent and Part-Time Faculty

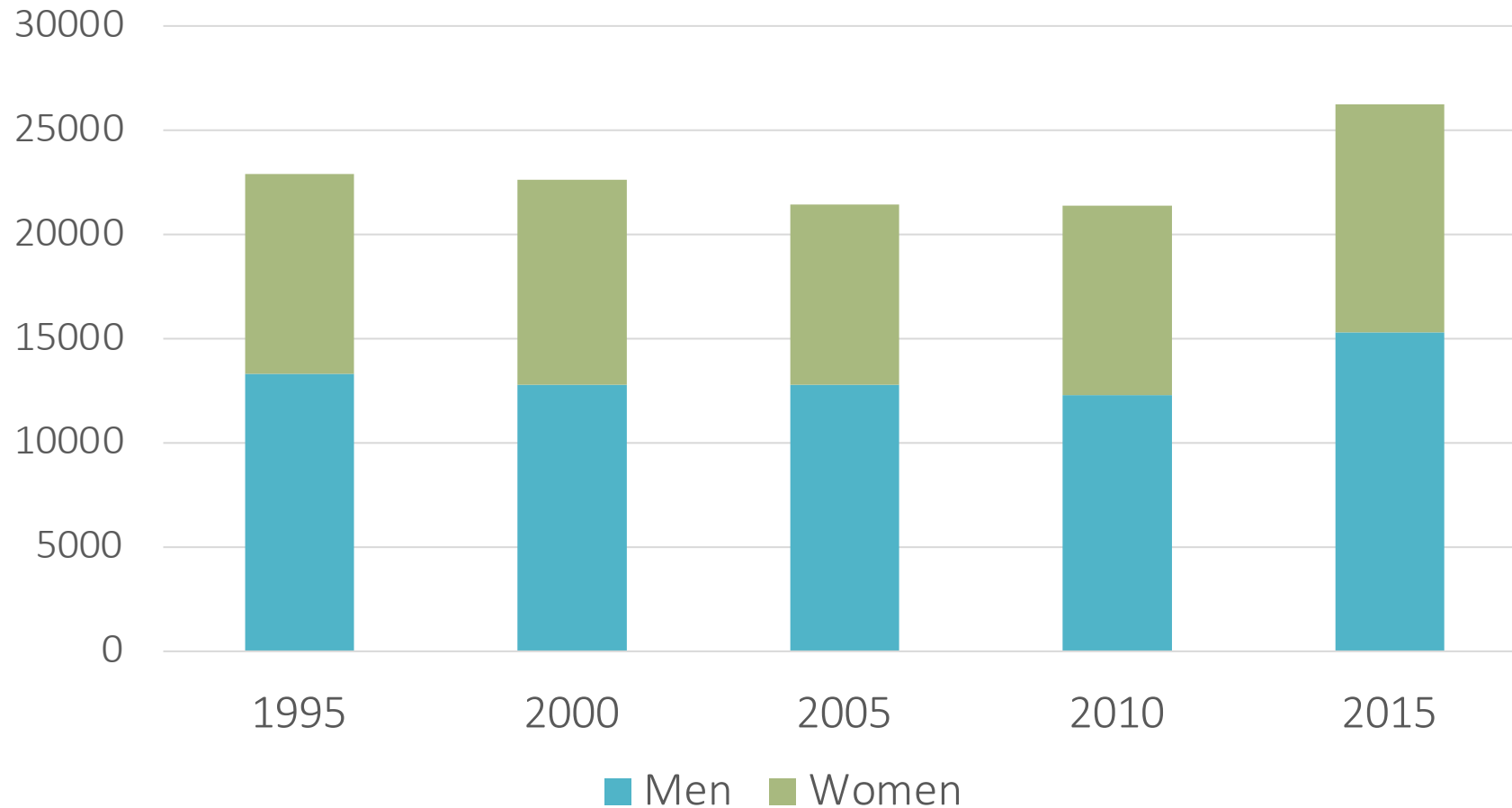


# Enrollment (in 1000s) at 4-Year Colleges by Course

| Course                         | 2000<br>(math) | 2005<br>(math) | 2010<br>(math) | 2015<br>(math) | 2000<br>(stat) | 2005<br>(stat) | 2010<br>(stat) | 2015<br>(stat) |
|--------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Math<br>Statistics             | 13             | 9              | 5              | 5              | 5              | 3              | 3              | 3              |
| Probability                    | 13             | 7              | 9              | 12             | 4              | 3              | 3              | 4              |
| Regression/<br>Correlation     | 1              | 1              | 2              | 2              | 1              | 2              | 2              | 3              |
| Stat<br>Software/<br>Computing | 0              | 0              | 1              | 1              | 1              | 1              | 1              | 2              |



# Bachelors Degrees Awarded by 4-year Math and Stat Depts



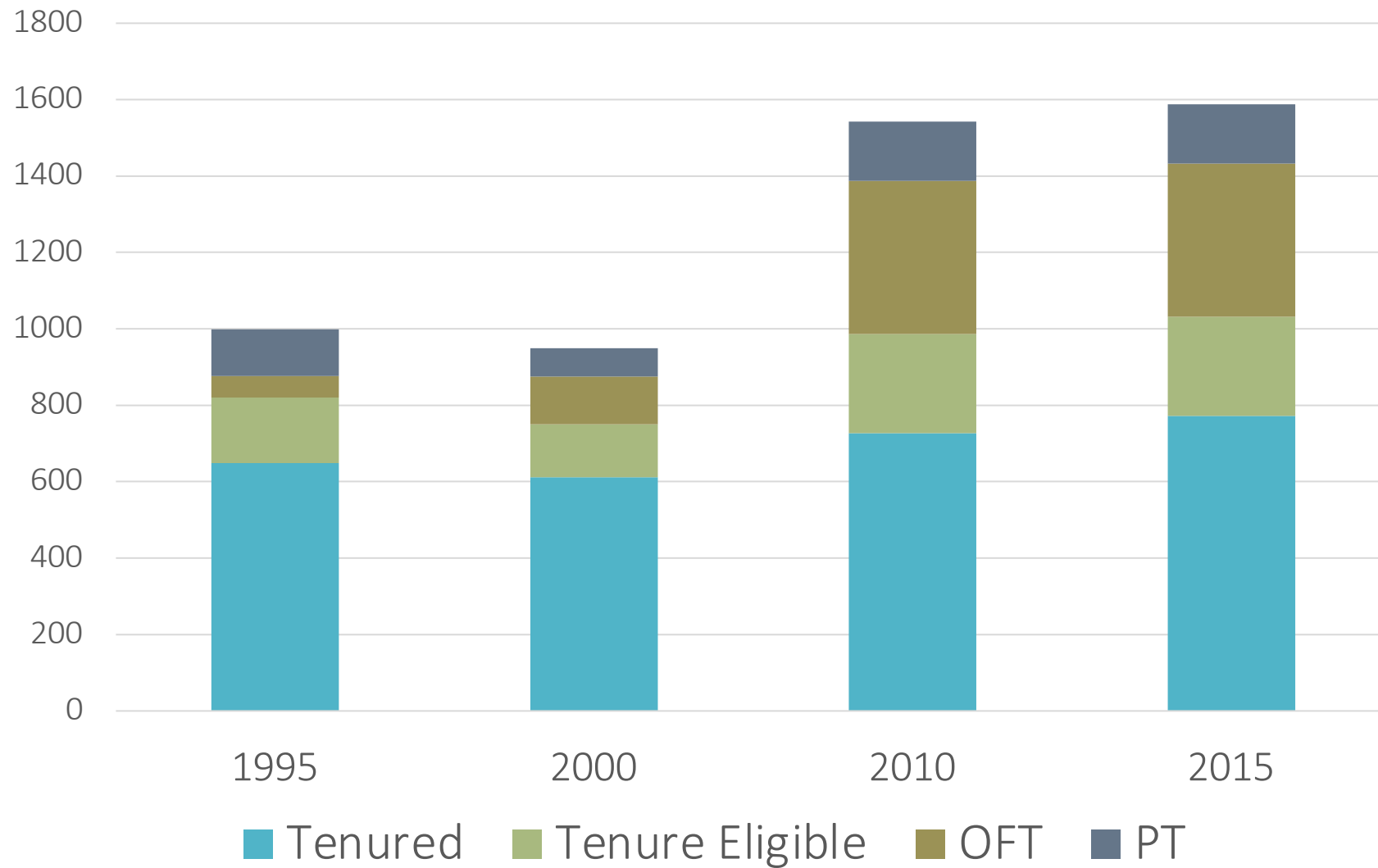
# Statistics Minors/Majors in Mathematics Departments

|                           | PhD | MA  | BA  |
|---------------------------|-----|-----|-----|
| Offer a stat minor        | 13% | 52% | 10% |
| Number of minor graduates | 305 | 323 | 384 |
| Offer a stat major        | 25% | 26% | 4%  |
| Number of major graduates | 126 | 133 | 157 |

# Full-time Faculty in 4-year Math Departments

| Department  | 2010  | 2015  | % increase |
|-------------|-------|-------|------------|
| Statistics  | 1266  | 1433  | 13%        |
| Mathematics | 22293 | 22532 | 1%         |

# 4-year Statistic Dept Faculty



# Graduate Degrees in Stat Among Intro Stat Instructors in 4-year Math Depts

| <b>%</b>                | <b>None</b> | <b>MA</b> | <b>PhD</b> |
|-------------------------|-------------|-----------|------------|
| Math Depts              |             |           |            |
| Univ (PhD)              | 52          | 29        | 18         |
| Univ (MA)               | 48          | 35        | 17         |
| Coll (BA)               | 68          | 18        | 14         |
| <b>Total Math Depts</b> | <b>64</b>   | <b>21</b> | <b>15</b>  |

# New in the 2021 Survey

- Equity, Diversity, and Inclusion (EDI)
- Instructional strategies in Introductory Statistics
- Technology uses in Introductory Statistics
- Revision and update of distance/remote learning questions
- Updated list of statistics course names

# New: Efforts to increase Equity, Diversity, and Inclusion

A question to assess the extent to which activities have taken place in the past year in departments in **response to increased national attention to equity, diversity, and inclusion issues.**

Options such as

- Faculty or student discussions designed to increase awareness of equity, diversity, and inclusion issues
- Program or policy changes to affect the demographic balance of faculty or undergraduate/graduate students in the mathematical sciences.
- Consideration of existing or new programs to assist underrepresented groups and/or at-risk students in the mathematical sciences.

# New: Instruction in Introductory Statistics

How often are each of these **instructional strategies** used in the Introductory Statistics courses taught in your department in Fall 2021?

Options: At least once a week      Occasionally      Never

- Focusing on conceptual understanding over formulas and procedures
- Integrating real world applications
- Students collect, organize, and analyze real data
- Using student-centered active learning strategies
- Using assessments such as regular graded homework or quizzes used to inform teaching



# New: Technology in Introductory Statistics

How successful is your program in adopting each of the following **use of technology** (graphing calculators, statistical software, online applets) in your Introductory Statistics (no calculus prerequisite) courses taught in Fall 2021?

Options: Very successful

Somewhat successful

Not successful

- Students use technology to explore concepts
- Instructors use technology to demonstrate concepts
- Students use technology to analyze data
- Students' ability to use technology to solve problems is assessed

# The 2021 CBMS Survey



Learn more:

<http://www.ams.org/profession/data/cbms-survey/cbms2020>

