# Proposal for a New Mt. SAC Math Multiple Measures Model

## (MMMMM!)

August 25, 2017

# **Current** Multiple Measures Model

- Take one of 4 levels of math placement test
- 1 or 2 points below cutoff score $\Rightarrow$ use multiple measures to decide if student gets "bumped up"
- We look at…
  - High school GPA
  - Total weekly time commitments
  - Number of college-level units completed
  - Highest math class passed with C or higher
  - Time since took that math course
  - Educational goal

# Current Multiple Measures - Research

12% 3%

85%

- Not MM eligible
- MM eligible but not approved
- MM approved
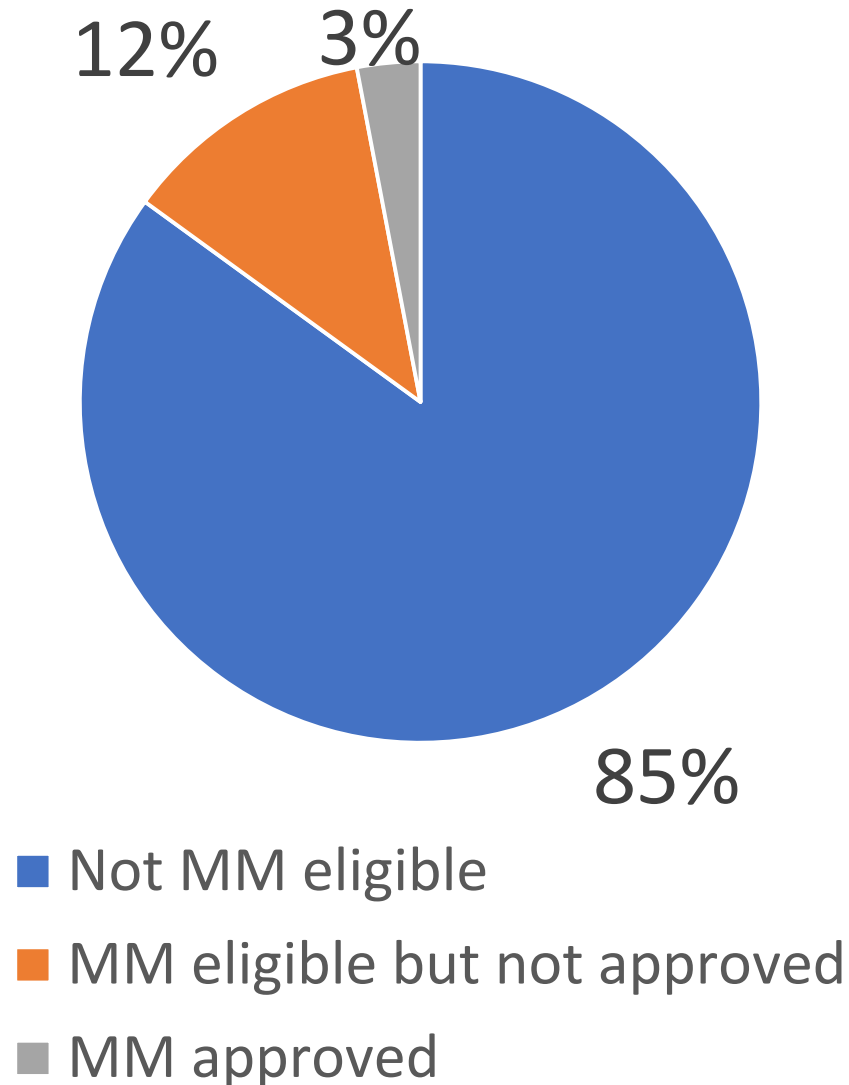
# **Current** Multiple Measures - Research

Success in first-placed math courses

- Level 1 (49, 50, 51)
  - MM students: 72%
  - Overall: 52%

- Level 2 (71, 71A, 71X)
  - MM students: 62%
  - Overall: 49%

- Level 3 (100, 110, 120, 130, 150)
  - MM students: 47%
  - Overall: 54%

# Proposed New Multiple Measures Model

1. Answer Student Success Inventory questions
   - High school GPA (11<sup>th</sup> or 12<sup>th</sup> grade, cumulative, unweighted)
   - Last math course
   - Grade in last math course
   - Current math course (if any)
2. Get math placement based on above high school performance
3. Encouraged, but not required, to take placement test (to try placing higher)

# Example student #1:

11th grade GPA 3.35          B- in Algebra 2

## High School Performance

Cumulative 11th grade GPA ≥ 3.2
Passed Algebra 2 with C or better

Eligible for…
**Math 100, 110, 110H, 120, or 130**

## Message to student

You're eligible to take…
**Math 100, 110, 110H, 120, or 130**

# Example student #2:

11th grade GPA 3.25          C+ in Algebra 2          Level 3 test: 15 (no Trig test)

## High School Performance

Cumulative 11th grade GPA ≥ 3.2
Passed Algebra 2 with C or better

Eligible for…
**Math 110, 110H, 120, or 130**

## Placement Test

Score < 21 on Level 3 test.

**Did not pass test,
so no placement.**

## Message to student

You're eligible to take…
**Math 110, 110H,
120, or 130**

# Example student #3:

12th grade GPA 2.95          A in Algebra 1          Level 3 test:  32 (no Trig test)

## High School Performance

Cumulative 12th grade GPA ≥ 2.9
Passed Algebra 1 with C or better

Eligible for…
**Math 71, 71A, or 71X**

## Placement Test

Score ≥ 21 on Level 3 test.

Eligible for…
**Math 100, 110, 110H,
120, 130, or 150**

## Message to student

You're eligible to take…
**Math 100, 110, 110H,
120, 130, or 150**

# Decision Rules

(See handout and next slide)

| Mt. SAC Math Course | Direct Matriculants | | Non-Direct Matriculants | |
|---|---|---|---|---|
| | Minimum 11th-grade GPA[1] | Last math course passed with C or better[1] | Minimum 12th-grade GPA[1] | Last math course passed with C or better[1] |
| Math 180 | 3.6 | Precalculus or Trigonometry | 3.5 | Precalculus or Trigonometry |
| | 3.2 | Precalculus | 3.1 | Enrolled in Calculus course |
| Math 160 | 3.4 | **Trigonometry[3]** | 3.3 | **Trigonometry[3]** |
| | 2.6 | Enrolled in Calculus course | 3.0 | Calculus |
| Math 150 | 3.4 | Algebra II | 3.3 | Algebra II |
| | 3.0 | Precalculus C+ or better | 2.8 | Precalculus |
| | 3.0 | Algebra II B or better | | |
| Math 140[2] | **3.4** | **Algebra II** | **3.3** | **Algebra II** |
| | **3.0** | **Precalculus C+ or better** | **2.8** | **Precalculus** |
| | **3.0** | **Algebra II B or better** | | |
| Math 130 | 3.2 | Algebra II | 3.2 | Algebra II |
| | 2.9 | Precalculus | 3.0 | Precalculus or Statistics |
| Math 120[2] | **3.2** | **Algebra II** | **3.2** | **Algebra II** |
| | **2.9** | **Precalculus** | **3.0** | **Precalculus or Statistics** |
| Math 110/110H | 3.0 | **Algebra II[4]** | 3.0 | **Algebra II[4]** |
| | 2.3 | Precalculus | 2.6 | Precalculus |
| Math 100 | 3.3 | **Algebra II[4]** | 3.2 | **Algebra II[4]** |
| | | | 2.9 | Statistics |
| Math 71/71A/71X | 2.8 | Algebra I | 2.9 | Algebra I |
| | | | 2.5 | Precalculus |
| Math 70S[2] | **2.4** | **No requirement** | **2.5** | **No requirement** |
| Math 51/51A | 2.4 | No requirement | 2.5 | No requirement |
| Math 50 | 2.0 | No requirement | 2.1 | No requirement |
| LERN 49/48[2] | Take Level 1 Placement Test results to determine if place into LERN 49 vs. LERN 48. | | | |

# Direct Matriculant (up through 11th grade transcript available)

| Highest math course taken in high school[2] | GPA ≥ 3.6 | GPA ≥ 3.4 | GPA ≥ 3.3 | GPA ≥ 3.2 | GPA ≥ 3.0 | GPA ≥ 2.9 | GPA ≥ 2.8 | GPA ≥ 2.6 | GPA ≥ 2.4 | GPA ≥ 2.3 | GPA ≥ 2.0 | GPA < 2.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calculus 1 (C or better)[3] | 180 | 180 | 180 | 180 | 160 | 160 | 160 | 160 | 110 | 110 | 50 | Test |
| Calculus 1 (enrolled)[4] | 180 | 180 | 180 | 180 | 160 | 160 | 160 | 160 | 110 | 110 | 50 | Test |
| Precalculus (C or better) | 180 | 180 | 180 | 180 | 140 150 | 120 130 | 110 | 110 | 110 | 110 | 50 | Test |
| Trigonometry (C or better) | 180 | 160 | 140 150 | 140 150 | 140 150 | 71 | 71 | 51 70S | 51 70S | 50 | 50 | Test |
| Algebra 2 (B or better) | 140 150 | 140 150 | 140 150 | 140 150 | 140 150 | 71 | 71 | 51 70S | 51 70S | 50 | 50 | Test |
| Algebra 2 (C or better) | 140 150 | 140 150 | 100 | 120 130 | 110 | 71 | 71 | 51 70S | 51 70S | 50 | 50 | Test |
| Algebra 1 (C or better) | 71 | 71 | 71 | 71 | 71 | 71 | 71 | 51 70S | 51 70S | 50 | 50 | Test |
| All other | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 50 | 50 | Test |

### Legend

| Value | Description |
|---|---|
| 180 | Calculus 1 |
| 160 | Precalculus |
| 140, 150 | Trigonometry, Business Calculus, Survey of Math, College Algebra, Finite Math, Statistics |
| 100 | Survey of Math, College Algebra, Finite Math, Statistics |
| 120, 130 | College Algebra, Finite Math, Statistics |
| 110 | Statistics |
| 71 | Intermediate Algebra |
| 51, 70S | Elementary Algebra |
| 50 | Pre-Algebra |
| Test | Placement via test for all other students |

[1] Refers to the total non-weighted GPA. Do not include weighted, academic, term-based, or yearly GPA.   [2] Highest math course taken in high school by increasing difficulty.

[3] Grade received in course. 'Or better' refers to a better grade in course or completion of a higher level course with C or better. [4] Student enrolled in Calculus 1 (no grade requirement).

# Non-Direct Matriculant (up through 12th grade transcript available)

| | GPA ≥ 3.5 | GPA ≥ 3.3 | GPA ≥ 3.2 | GPA ≥ 3.1 | GPA ≥ 3.0 | GPA ≥ 2.9 | GPA ≥ 2.8 | GPA ≥ 2.6 | GPA ≥ 2.5 | GPA ≥ 2.3 | GPA ≥ 2.1 | GPA < 2.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calculus 1 (C or better)[4] | 180 | 180 | 180 | 180 | 160 | 140 150 | 140 150 | 110 | 71 | 50 | 50 | Test |
| Calculus 1 (enrolled)[5] | 180 | 180 | 180 | 180 | 140 150 | 140 150 | 140 150 | 110 | 71 | 50 | 50 | Test |
| Precalculus (C or better) | 180 | 160 | 140 150 | 140 150 | 140 150 | 140 150 | 140 150 | 110 | 71 | 50 | 50 | Test |
| Trigonometry (C or better) | 180 | 160 | 120 130 | 120 130 | 120 130 | 100 | 51 70S | 51 70S | 51 70S | 50 | 50 | Test |
| Statistics (C or better) | 140 150 | 140 150 | 120 130 | 120 130 | 120 130 | 100 | 51 70S | 51 70S | 51 70S | 50 | 50 | Test |
| Algebra 2 (C or better) | 140 150 | 140 150 | 120 130 | 110 | 110 | 71 | 51 70S | 51 70S | 51 70S | 50 | 50 | Test |
| Algebra 1 (C or better) | 71 | 71 | 71 | 71 | 71 | 71 | 51 70S | 51 70S | 51 70S | 50 | 50 | Test |
| All other | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 51 70S | 50 | 50 | Test |

[1] Refers to the total non-weighted GPA. Do not include weighted, academic, term-based, or yearly GPA.

[3] Highest math course taken in high school by increasing difficulty.

[4] Grade received in course. 'Or better' refers to a better grade in course or completion of a higher level course with C or better.

[5] Student enrolled in Calculus 1 (no grade requirement).

**Legend**

| | |
|---|---|
| 180 | Calculus 1 |
| 160 | Precalculus |
| 140, 150 | Trigonometry, Business Calculus, College Algebra, Finite Math, Survey of Math, Statistics |
| 120, 130 | College Algebra, Finite Math, Survey of Math, Statistics |
| 100 | Survey of Math, Statistics |
| 110 | Statistics |
| 71 | Intermediate Algebra |
| 51, 70S | Elementary Algebra |
| 50 | Pre-Algebra |
| Test | Placement via test for all other students |

# Details…

- We will use **self-reported GPAs**.
  - State/national research:  self-reported GPAs accurate
  - From Student Success Inventory (or CCCApply?)
  - We can randomly check student transcripts by hand to ensure accuracy
- We will **not require GPAs to be recent**.
  - Statewide research:  GPAs as old as 10 years are still correlated with student success better than placement tests

# More Details…

- **Students will be shown highest course(s) they place into**
    - Ex: "Math 71, 71A, or 71X" and **not** "LERN 48, LERN 49, Math 50, Math 51/51A, Math 61, Math 70S, and Math 71/71A/71X."
    - Full list of what student would see
        - 48/49 → Take Level 1 placement test
        - 50 → 50
        - 51 → 51, 51A, 70S
        - 71 → 71, 71A, 71X
        - 110 → 110
        - 11th-grade GPA
            - 120/130 → 110, 120, 130
            - 100 → 100, 110, 120, 130
        - 12th-grade GPA
            - 100 → 100, 110
            - 120/130 → 100, 110, 120, 130
        - 140/150 → 100, 110, 120, 140, 150
        - 160 → 160
        - 180 → 180

# More Details…

- **Students placing into transfer-level courses will be strongly advised to seek counseling about which math course they should take.**
  - Ex:  STEM student places into Statistics (Math 110)
    - Math 71?
    - Take a placement test and place into Math 150?
    - Counseling could help the student make these kinds of decisions

# More Details…

- **Schedule of classes and catalog updates**
  - Ex: Prerequisite to Math 110: "MATH 71 or MATH 71X or MATH 71B or equivalent authorized placement"
  - Not mention GPA cutoffs or other methods of eligibility (counselors, department chair, petitions, AP/IB tests, etc.)
- **Student Success Inventory updates**
  - Plus and minus grades (for example, B+ and B-)
  - Separate options for Trigonometry and Precalculus
  - Options for Statistics and Integrated Math 1, 2, 3, and 4
  - Option for "I don't have a high school GPA" (these students would be required to take a placement test)
  - A way to determine if the GPA is an 11th-grade GPA or a 12th-grade GPA
  - An option to select their highest math course currently enrolled in (if any)

**Q:  What about Integrated Math?**

**A:  Here's the order:**

Prealgebra
Algebra 1
Integrated Math 1
Integrated Math 2
Geometry
Algebra 2
Integrated Math 3
Statistics
Integrated Math 4
Trigonometry
Precalculus
Calculus

# More Details…

- **Research to determine if new placement system is effective**
  - Compare differences in placement distributions
  - Compare differences in course success rates
  - Look at transfer-level completion rates

# Research at Mt. SAC

**Q: How would the placement distribution change?**

- Looked at 18544 students who took placement tests between March 1, 2015 and February 28, 2017, and completed Student Success Inventory (SSI)
- Couldn't use all decision rules because SSI not detailed enough
  - No way to input B+ or B-
  - Doesn't distinguish between Precalculus and Trigonometry
- Only first decision rule for each course was used
- So, it's a conservative study

# Research at Mt. SAC

**Q:  How would the placement distribution change?**

**<u>Transfer-level placements:  19% → 39%</u>**

| Study Cohort's Placement Rate Comparison (N=18544) | | | |
|---|---|---|---|
| Current Math Placement Tests | | Proposed MM Rules  (Simplified) | |
| Placed Course | Percent | Placed Course | Percent |
| LERN48 | 4.1% | LERNs | 7.7% |
| LERN49 | 21.6% | | |
| MATH50 | 19.8% | MATH50 | 8.1% |
| MATH51 | 7.8% | MATH51/70S | 24.3% |
| MATH61_71 | 17.0% | MATH71 | 21.1% |
| MATH100-150 | 12.4% | MATH110 | 13.5% |
| | | MATH120-130 | 2.5% |
| | | MATH100 | 3.6% |
| | | | |
| MATH140 | 1.8% | MATH140-150 | 6.8% |
| MATH160 | 0.7% | MATH160 | 3.9% |
| MATH180 | 4.0% | MATH180 | 8.6% |
| RETEST | 10.8% | | |

| Course Placement | By Proposed Rules on High School GPA & Last HS Math Course Completed (Self-reported in SSI)-Simplified | | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | LERNS | | 50 | | 51/70S | | 71 | | 110 | | 120-130 | | 100 | | 140-150 | | 160 | | 180 | | |
| By Current Tests | # | Row %* | # | Row % | # | Row % | # | Row % | # | Row % | # | Row % | # | Row % | # | Row % | # | Row % | # | Row % | Total # |
| LERN48 | 142 | 19% | 91 | 12% | 224 | 30% | 229 | 30% | 47 | 6% | 2 | 0% | 2 | 0% | 13 | 2% | | 0% | 3 | 0% | 753 |
| LERN49 | 541 | 14% | 480 | 12% | 1204 | 30% | 1227 | 31% | 282 | 7% | 30 | 1% | 49 | 1% | 142 | 4% | 15 | 0% | 32 | 1% | 4002 |
| MATH50 | 330 | 9% | 386 | 11% | 1043 | 28% | 969 | 26% | 451 | 12% | 57 | 2% | 88 | 2% | 230 | 6% | 42 | 1% | 73 | 2% | 3669 |
| MATH51 | 97 | 7% | 91 | 6% | 378 | 26% | 256 | 18% | 225 | 16% | 30 | 2% | 52 | 4% | 169 | 12% | 35 | 2% | 112 | 8% | 1445 |
| MATH61_71 | 114 | 4% | 176 | 6% | 634 | 20% | 509 | 16% | 584 | 19% | 122 | 4% | 184 | 6% | 317 | 10% | 176 | 6% | 340 | 11% | 3156 |
| MATH100-150 | 46 | 2% | 68 | 3% | 334 | 15% | 233 | 10% | 390 | 17% | 114 | 5% | 139 | 6% | 187 | 8% | 259 | 11% | 532 | 23% | 2302 |
| MATH160 | 2 | 2% | 2 | 2% | 16 | 13% | 10 | 8% | 22 | 18% | 6 | 5% | 5 | 4% | 13 | 10% | 14 | 11% | 34 | 27% | 124 |
| MATH140 | 7 | 2% | 2 | 1% | 38 | 11% | 24 | 7% | 69 | 20% | 17 | 5% | 19 | 6% | 17 | 5% | 49 | 14% | 100 | 29% | 342 |
| MATH180 | 28 | 4% | 16 | 2% | 98 | 13% | 51 | 7% | 101 | 14% | 29 | 4% | 43 | 6% | 38 | 5% | 76 | 10% | 261 | 35% | 741 |
| RETEST | 112 | 6% | 191 | 10% | 531 | 26% | 403 | 20% | 326 | 16% | 52 | 3% | 88 | 4% | 136 | 7% | 59 | 3% | 112 | 6% | 2010 |
| Grand Total | 1419 | 8% | 1503 | 8% | 4500 | 24% | 3911 | 21% | 2497 | 13% | 459 | 2% | 669 | 4% | 1262 | 7% | 725 | 4% | 1599 | 9% | 18544 |

* Percentages were rounded to whole numbers

# Research at Mt. SAC

**Q: What percent of students might place at the same or higher level than a placement test?**

**A: More than 78%\***

MMAP > test:       **60%**    (10296/17259)

MMAP = test:       **18%**    (3078/17259)

MMAP < test:       **23%**    (3885/17259)

\*Note: 78% is a conservative estimate since not all decision rules could be researched. See report from Research department.

# Research at Riverside City College

**Q:  What percent of students place at the same or higher level than a placement test?**

**A:  84%**

MMAP > test:          **64%**     (764/1201)

MMAP = test:          **20%**     (242/1201)

MMAP < test:          **16%**     (195/1201)

(The test is Accuplacer.)

# When?

- Goal:  Start placing students for Fall 2018 classes.
- Tentative timeline:

**August 25, 2017**:  Share proposal with Math Department
**September 15**:  Get proposal approved by Math Department
**September 27**:  Take proposal to SSSPAC
**October 2**:  Take proposal to SP&S
**October 5**:  Take proposal to Academic Senate Executive Board
**October 12**:  Take proposal to Academic Senate
**October 2017 - June 2018**:   Collaborate with Assessment Center, Student Services, counselors, Natural Sciences division deans, Math Department Chair, Instruction office, corequisite projects, acceleration projects, Common Assessment team, SSSPAC, Math Placement Test Info Session facilitators, RIE, IT, RP Group
**Summer 2018**:  Activate new multiple measures system for students enrolling Fall 2018