PATHWAYS TO TRANSFER-LEVEL MATHEMATICS AND QUANTITATIVE REASONING COURSES

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THURSDAY, OCTOBER 4 | 11:15 – 12:15
Outline

• What Is Quantitative Reasoning
• Math and Quantitative Reasoning Task Force
• New C-ID Descriptors
• Why Pathways are Important
• Some Common Questions from the Field about AB 705
# Mathematics and Quantitative Reasoning

<table>
<thead>
<tr>
<th>QUANTITATIVE COURSE SELECTION: COURSES FULFILLING QUANTITATIVE REASONING REQUIREMENTS AT SIX UNIVERSITIES</th>
</tr>
</thead>
</table>
| **Stanford**  
- Cancer Epidemiology  
- Riding the Data Wave  
- Electric Automobiles and Aircraft  
- Experimental Economics  
- Remote Sensing of the Oceans  
- Feeding Nine Billion  |
| **San Francisco State University**  
- Calculus with Business Applications  
- Data Analysis in Education  
- Calculus or Business Calculus  
- Elementary Statistics  
- Pre-Calculus  
- Quantitative Reasoning in Psychology  |
| **Harvard**  
- Making Sense: Language, Logic, and Communication  
- Analyzing Politics  
- Deductive Logic  
- Nutrition and Health  
- Myths, Paradigms, and Science  
- Great Ideas in Computer Science  |
| **Cal State University- Northridge**  
- College Algebra  
- Mathematical Methods for Business  
- Pre-Calculus  
- Mathematical Ideas  
- Introductory Statistics  
- Calculus for the Life Sciences  |
| **UCLA**  
- Biostatistics  
- Computing  
- Inductive Logic (Philosophy)  
- Introduction to Data Analysis (Political Science)  
- Statistics  |
| **CUNY- College of Staten Island**  
- Mathematics for Liberal Arts  
- Finite Mathematics  
- Probability and Statistics  
- College Algebra and Trigonometry  
- Pre-Calculus  |

Source: Institutions’ websites. With the exception of San Francisco State University, the courses listed are a subset of those accepted to meet quantitative reasoning requirements.
Minimum CSU/UC Entrance Requirements in Mathematics for Freshmen

• Intermediate Algebra/Algebra II – 3rd course in Algebra I, Geometry, Algebra II sequence: traditional sequence

  OR

• Integrated Math III – 3rd course in Common Core sequence; completion of this sequence is equivalent to completion of traditional sequence
The Mathematics and Quantitative Reasoning Task Force Organizations

- Academic Senate for California Community Colleges (ASCCC)
  - Title 5 §53206 – The ASCCC role in formation of policies in regard to academic and professional matters, recognized as the voice of the community college academic senates before the Board of Governor’s and the Chancellor’s Office

- California Mathematics Council Community Colleges (CMC³)
  - Affiliate of the American Mathematics Association of Two-Year Colleges (AMATYC)
  - Founded in 1972 to provide a forum through which community college mathematics faculty in Northern and Central California can express themselves professionally at a local, state and national level...

- California Mathematics Council Community Colleges – South (CMC³-South)
  - Affiliate of the American Mathematics Association of Two-Year Colleges (AMATYC) and the California Mathematics Council (CMC)
  - Dedicated to the professional growth of mathematics educators in Southern California
Math and Quantitative Reasoning Task Force (MQRTF)

- Proactive effort to address mathematics and quantitative reasoning in the CCCs
- Partnership with representatives from ASCCC, CMC³, and CMC³-South
- Membership includes diverse perspectives on mathematics and quantitative reasoning
- Guided by commitment to equity...empowering students to be successful in a technologically evolving society
- Considerations for both B-STEM and SLAM curriculum
Math and Quantitative Reasoning Task Force

Why form the MQRTF?

• Math Competency Requirement in Title 5
• Quantitative Reasoning Requirement for CSU GE Breadth and IGETC patterns
• General Education requirements are academic and professional matters
• AB 705 and CSU EOs 1100/1110 are requiring major curricular changes
• Purview of both ASCCC and Discipline Faculty
New C-ID Descriptors: Pre-Transfer Level Intent...

- Courses may be offered as concurrent or preparatory student support based on local placement policies
- Structured so that students have a path to complete transfer level within a one-year time frame (or less)
- Optional curriculum for colleges to consider – Not a requirement!
- Descriptors less prescriptive, more flexible – colleges tailor courses for their student populations
New C-ID Descriptors: Pre-Transfer Level

Process...

- Academic Senate for California Community Colleges Resolution 9.02 S18: *Pathways to Meet General Education Requirements of Quantitative Reasoning*
- The MQRTF served as the Faculty Discipline Review Group
- Comment period from the field
- Finalized in September 2018
- Posted on C-ID Website under Resources
New C-ID Descriptors: Pre-Transfer Level

The Descriptors...

- Based on **local** placement processes and student populations
  - Concurrent or Preparatory Support
  - Flexibility in course content and unit load
  - Lecture, Lab, or combination format
  - Credit or noncredit
  - Options – not a requirement

- Four descriptors
  - 50x – Elementary Mathematics
  - 60x – Fundamentals of Algebra for Statistics or Liberal Arts
  - 70x – Foundations of Algebra for Mathematics-Intensive Fields
  - 80x – Algebra for Transition into Mathematics-Intensive Fields
C-ID Descriptors – A Closer Look...

50x – Elementary Mathematics

• Review of basic mathematics, pre-algebra and an optional algebra introduction – baseline topics for success in 60x and 70x

• Lecture and/or lab format, possibly noncredit

• Units are commensurate with the depth and breadth of topics, modules

• Corequisite/concurrent OR Prerequisite/preparatory based on local placement practices
C-ID Descriptors – A Closer Look...

60x – Fundamentals of Algebra for Statistics or Liberal Arts

- Elements of beginning and intermediate algebra needed for statistics, liberal arts mathematics, or other non-mathematics-intensive fields.
- Lecture and/or lab format, possibly noncredit
- Units are commensurate with the depth and breadth of topics, modules

**Advisories/Recommended Preparation**: Algebra I or the equivalent through the Common Core State Standards in Mathematics (CCSSM). Options for students who have not attained these skills may include:

a. Corequisite/concurrent model of C-ID Math 50X Elementary Mathematics

b. Prerequisite/preparatory model of C-ID Math 50X Elementary Mathematics
C-ID Descriptors – A Closer Look...

70x – Foundations of Algebra for Mathematics-Intensive Fields

• Elements of beginning and intermediate algebra needed for mathematics-intensive fields. Includes baseline exit skills of an intermediate algebra course for students pursuing majors in mathematics-intensive fields.
• Lecture and/or lab format, possibly noncredit
• Units are commensurate with the depth and breadth of topics, modules

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a. Corequisite/concurrent model of C-ID Math 50X Elementary Mathematics
b. Prerequisite/preparatory model of C-ID Math 50X Elementary Mathematics
C-ID Descriptors – A Closer Look...

80x – Algebra for Transition into Mathematics-Intensive Fields

- A “bridge course” for students who have been placed into or have completed a transfer-level quantitative reasoning course from a non-mathematics intensive pathway.
- Lecture and/or lab format, possibly noncredit,
- Units are commensurate with the depth and breadth of topics, modules
- Course requested by college and system leaders to provide pathway to B-STEM
Default Placement Rules

• The default placement rules are derived as an option for colleges who choose to do nothing regarding their curricular design, and placement practices.

• Colleges are encouraged to evaluate their curriculum, placement practices, and support services to figure out how best to serve their communities. These descriptors are possible starting points for local discussion about how to serve a college community.
MQRTF Next Steps

Will provide a report to include the following topics:

• Who are our students?
• What about STEM?
• Use of high school transcript data
• One size does not fit all
• Data analyses considerations
• Legislation and regulations
• Course taking options
• Guided self placement
• Affective domain
The Intersection between Program Mapping, Metamajors and Quantitative Reasoning

- CSU Area B4 **Quantitative Reasoning** and IGETC Area 2 Mathematical Concepts and Quantitative Reasoning
- Statewide data - 1629 transfer quantitative reasoning courses
- Different Course types – 483 unique variations
- Individual Colleges average 14 different transfer level courses that fill these requirements
- Many of these courses are not counted in the KPI’s (key performance indicators) or CCCCCO Scorecard
- Programming Methods & Computer Discrete Math (Computer Science); Behavioral Statistics; Biostatistics; Business Calculus, Business Math, Liberal Studies Math
Meta Majors with Program Mapping

Behavioral economics tells us that too much choice — especially uninformed choice — leads to indecision or poor decisions. We also know that a substantial number of people accept — even welcome — a default choice designed by informed professionals.
Math – selecting the right math depends on your major & career goal

- No transfer
  - Local
  - Quantitative Reasoning Course
  - Graduation Requirement

- Biology
  - Biostats
  - Precalculus
  - Calculus

- Chemistry, Physics, Engineering & Math
  - College Algebra for STEM
  - Precalculus
  - Calculus

- Computer Science
  - Finite Math

- Career Education
  - Career Tech Math or local Quantitative Reasoning

- Business, Economics and some Social Sciences
  - Business Calculus, Finite Math

- Other majors
  - College Algebra or Liberal Studies

- Education
  - Math for Elementary Teachers, Liberal Studies Math, Foundations of Math

- Humanities, Human Resources, Public Safety, Journalism, Allied Health, Communication
  - Behavioral Science Statistics, Introduction to Statistics

- STEM - Science, Technology, Engineering & Math
The Dana Center Mathematics Pathways seeks to ensure that ALL students in higher education will be:

- Prepared to use mathematical and quantitative reasoning skills in their careers and personal lives;
- Enabled to make timely progress towards completion of a certificate or degree; and
- Empowered as mathematical learners.
Multiple Paths FORWARD: Diversifying Mathematics as a Strategy for College Success
Pathways and CCC Students

- What are their Educational Goals?

2016-17 degrees awarded by percent of award

- Associate in Science for Transfer (A.S.-T) Degree
- Associate in Arts for Transfer (A.A.-T) Degree
- Associate of Science (A.S.) degree
- Associate of Arts (A.A.) degree
- Certificate requiring 60+ semester units
- Certificate requiring 30 to < 60 semester units
- Certificate requiring 18 to < 30 semester units
- Certificate requiring 12 to < 18 units
Is Intermediate Algebra no longer required for transfer level quantitative reasoning courses?

CSU EO removed the explicit requirement of an intermediate algebra prerequisite for courses to qualify for CSU GE Area B4.

IGETC Standards allow for the acceptance of statistics courses with alternative prerequisites. Other courses for IGETC still have intermediate algebra as a required prerequisite.

It is unclear whether the removal of intermediate algebra would impact course to course articulation.
If we choose not to use the default placement rules, and we create new developmental courses, do we have two years to collect data to show that our placement rules and courses meet or exceed the results from the default placement rules?

Yes, colleges that develop new curriculum have up to two years to collect data and demonstrate that it is more effective than default placement.

Colleges exploring this option will need to disaggregate throughput data into HS GPA bands and each band must meet or exceed the default.

Colleges do not have two years to collect data on existing curriculum. Your college already has data on those courses.
Are colleges required to only use high school performance data when placing students?

No, colleges should use multiple measures of student capacity including tools such as guided self placement, but the high school data must be one of the measures and all measures must be disjunctive (high performance on one measure offsets low performance another).

For example, a college could choose to use the default rules and give all students access to transfer level statistics, but share sample assignments with them and allow the student to choose whether or not to enroll in concurrent support.
Is it okay to have questions/problems for students to solve in order to give them an idea of the types of skills necessary for the class?

Yes, you can provide students with sample exams/assignments to give them an idea of what a particular course requires.

You cannot require students to complete any problems and use that information in the placement process. That is considered a placement test and would need to be approved by the Board of Governors.
Does AB 705 guarantee all students access to any transfer level mathematics course? For example, can all students now enroll in Calculus I?

No! AB 705 does not automatically bypass transfer level prerequisites nor does it guarantee access to transfer level for every student.

Your college can still place students into Calculus I, but students must be assessed to be Calculus ready or have completed the prerequisites.
What additional Measures may help to place students into courses above the initial transfer level?

- GSP
- AP scores
- CLEP
- EAP
- ERWC
- SAT
- ACT
Can a college require students to enroll in a corequisite course?

Per the FAQ, colleges can require students to enroll in a credit or noncredit corequisite course.

Colleges creating new curriculum will have up to two years to collect data showing that students are more successful (than the default prediction or local data) than students not taking the corequisite course.

While there are currently no limits on the number of hours/units a corequisite can have, AB 705 encourages colleges to minimize the number of units that students accumulate.
Should we delete our basic skills prerequisites from transfer level courses?

Colleges should not delete any prerequisites at this time.

Modifying prerequisites will require colleges to resubmit courses for articulation review and there is currently no guarantee your courses will be approved.

Placement processes does not impact the articulation of your courses. Articulation is based on requisites, content, assignments, etc.
Joint Memo from CSU and UC concerning CSU Breadth and IGETC

- In light of the extensive curricular modifications the CCC campuses are making due to AB 705, CSU and UC are offering an extended deadline for the annual GE CSU GE Breadth and IGETC reviews for courses in **CSU Subarea B4/IGETC 2A (Mathematics/Quantitative Reasoning)** and **CSU Subarea A2/IGETC 1A (English Composition / written communication)** for this year only.

- The regular deadline for all courses is December 7, 2018. For the **above-listed areas only**, the extended deadline will be March 1, 2019. **The effective date for approved courses** in both cases will be fall 2019.

- Additional details will be provided in the annual call for course submissions which will be distributed shortly.
Questions and Comments
Additional ASCCC Resources

Academic Senate for California Community Colleges AB 705 Resources:
https://asccc.org/ab-705-resources

Math and Quantitative Reasoning Task Force:
https://asccc.org/directory/math-and-quantitative-reasoning-task-force

DEGREES OF FREEDOM: Diversifying Math Requirements for College Readiness and Graduation (Report 1 of a 3-part series) (Burdman, 2015)

Reforming Math Pathways at California’s Community Colleges, PPIC 2017
GUIDED SELF PLACEMENT
Students Without Transcript Data

• Many of our students will not have high school transcript data or may be returning students that haven’t been in school in decades.

• In the past, colleges would have used assessment tests or locally developed measures to place these students, but those tools will not be allowable beginning in Fall 2019.

• Currently, colleges can use guided self-placement.

• While guided self-placement can only be the primary placement tool for students without transcript data, several steps will apply to all students during the onboarding process.
Guided Self-Placement

Guided Self-Placement (GSP) is a locally developed tool or process that allows students, in consultation with counselors or other faculty, to determine suitable coursework including the appropriate mathematics, English, and English as a Second Language (ESL) entry-level course.

GSP encourages students' personal metacognitive evaluation and self-determination as a part of the placement process.

Establishing an effective GSP process can be the first step in ensuring students select an appropriate place to begin their academic journey.
Guided Self-Placement

GSP tools provide students with basic information about multiple measures and help them, through questions, examples, and course descriptions, determine the appropriate level of placement aligned with the student’s educational goals.

The goal of GSP is not to challenge transfer-level placement but rather to help students integrate self-analysis with data and course expectations with the goal of optimizing student investment, experience and resolve.

GSP is being implemented by many CSUs and has been used effectively across the U.S. when implemented appropriately.
Step 1: Career Counseling

Students should be informed about the difference between degrees, certificates, transfer and professional degrees and be provided an opportunity to explore their interests and potential employment options.
Step 2: Selecting a Metamajor and Major

Step 2: Selecting a Metamajor and Major which helps to clarify the Mathematics and GE Pathways. Colleges should list the desired mathematics pathways by metamajors and/or programs for students to reference (This list is not intended to be exhaustive and the structure and designation of metamajors is locally determined).

1. STEM (Science, Technology, Engineering, or Mathematics)- pre-calculus, trigonometry, calculus, biostats, College Algebra
2. Business and Accounting – finite mathematics, business calculus, statistics
3. Education – liberal studies mathematics, contemporary mathematics, Fundamentals of Mathematics
5. Humanities, Hospitality – Quantitative reasoning
Step 3: Clarify Overall Educational Goal

Begin with a student’s informed goal: students should select a goal that is aligned to their ultimate educational pathway. If the intent is to continue their education beyond a certificate or an associate degree at some time in the future, this will influence current course-taking, even if the student’s short-term goal is to complete a certificate or associate degree and get a job.
Step 4: Clarify Appropriate Coursework

Step 4: Clarify English or English as a Second Language (ESL) and Mathematics Coursework

- Colleges should provide sample coursework for transfer level composition courses including examples from integrated reading, writing, English as a Second Language (ESL), or other appropriate coursework. In addition, sample mathematics work for entry level skills beginning with the graduation requirements for quantitative reasoning, career technical courses and sequential mathematics courses, should be provided, recognizing students may enter higher than the entry level courses based upon previous work.
Step 4: Review Any Previous Coursework

Step 5: Review previous coursework in high school, at other colleges or through testing

- Students should examine their High School GPA
- Students should review any AP, CLEP or other diagnostic testing scores e.g. EAP, SAT, ACT, etc
- Students should review completed coursework in English, English as a Second Language (ESL) and Mathematics
Step 6: Identify Potential GE Pathway

Step 6: Identify Potential GE pathway to clarify requirements meeting graduation and transfer

- Does the student intend to complete coursework to transfer?
- Transfer to CSU or Private – CSU Breadth or IGETC – ADT (Associate Degree for Transfer)
- Transfer to UC – IGETC and Transfer Agreement
Step 7: Review Placement Rules

Step 7: Review the Default placement rules or locally determined placement rules. The Default rules are below. (The English as a Second Language (ESL) and English rules are similar in terms of the GPA Decision Rules). Note: Each high school GPA is associated with the predicted success rate.
Career Counseling

Select a Metamajor or and/or major

Clarify your educational goal

Select English/ESL and Mathematics/Quantitative Reasoning Pathways

Identify appropriate General Education (GE)

Review other Data and Default or Local Placement Rule Set

• Interests
• Wages
• Benefits
• Skills
• Long term plans
• Life values
• Personality
• Occupational research
• Location
• Responsibilities

✓ Complete guaranteed transfer degree to CSU
✓ Complete AA and transfer
✓ Complete short-term certificate or local AA
✓ Complete a course or two for work advancement
✓ Complete courses for individual interest

English and English as a Second Language (ESL)
- Read, analyze, and evaluate texts, applying rhetorical strategies and integrating ideas without plagiarism
- Find, evaluate, analyze, and cite sources for essays

Mathematics/Quantitative Reasoning
- STEM calculus
- Business
- Education
- Statistics
- Career Technical

✓ Transfer to CSU or private college – CSU breadth
✓ Transfer to UC - IGETC
✓ No transfer local degree or certificate – local GE

• Transfer to CSU or private college – CSU breadth
• Transfer to UC - IGETC
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✓ High School GPA
✓ High School Courses & other curriculum
✓ test scores e.g. AP, SAT
✓ CLEP test results
✓ Employment experience
✓ Military Experience
✓ Time available for classwork & support
✓ Financial needs
✓ See default placement using high school GPA

Select a Metamajor or and/or major

Clarify your educational goal

Select English/ESL and Mathematics/Quantitative Reasoning Pathways

Identify appropriate General Education (GE)

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Clarify the student’s education goal:

<table>
<thead>
<tr>
<th>Statewide Awards 2017-2018</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate in Science for Transfer (A.S.-T) Degree</td>
<td>18,597</td>
</tr>
<tr>
<td>Associate in Arts for Transfer (A.A.-T) Degree</td>
<td>21,855</td>
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<tr>
<td>Associate of Science (A.S.) degree</td>
<td>28,688</td>
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<tr>
<td>Associate of Arts (A.A.) degree</td>
<td>61,707</td>
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<tr>
<td>Certificate requiring 60+ semester units</td>
<td>565</td>
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<tr>
<td>Certificate requiring 30 to &lt; 60 semester units</td>
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<tr>
<td>Certificate requiring 18 to &lt; 30 semester units</td>
<td>16,804</td>
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<td>Certificate requiring 12 to &lt; 18 units</td>
<td>5,540</td>
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<tr>
<td>Certificate requiring 6 to &lt; 18 semester units</td>
<td>15,487</td>
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<tr>
<td>Bachelor’s Degrees</td>
<td>135</td>
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<tr>
<td>Other Credit Award, &lt; 6 semester units</td>
<td>2,634</td>
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Total: 211,936