



## Program Review - Instructional Program Plan

Program Title: Mathematics

Lead Contact Person: Evan Innerst

Writing Team Rich Follansbee, Michael Hoffman, Denise Hum, Evan Innerst, Ray Lapuz, Po Tong

### **Executive Summary**

Please summarize your program's strengths, opportunities/challenges, and action plans. This information will be presented to the Board of Trustees. (1000 word limit)

The math program continues to adapt to the needs of its students, both in terms of the skills they enter college with and the skills they need to leave with. Currently big changes are happening in the high schools that affect the skill sets that our students bring to Canada. The common core work that is taking place in the high schools is forcing us to rethink our basic skills sequences. Denise Hum continues to participate in the San Mateo County Regional Math Collaboration to work with math faculty from our sister colleges and area high schools to continue to discuss Common Core State Standards, Mathematics and other articulation issues such as placement and assessment.

In addition, the math program is trying to shorten the paths to transfer for both STEM and non STEM majors. A group of faculty including Ray Lapuz, Michael Hoffman, Yvette Butterworth, and David Monarres are participated in 3CSN's California Acceleration Project. We have implemented both an accelerated path to transfer level statistics for our non STEM majors and an accelerated path to calculus for our STEM majors.

One of the challenges we face is the lack of a full time instructional aid for mathematics in the learning center. Nancy Ward retired last year and her position has not been replaced. There is also a continuing need for a test proctoring center to support all of the college's online classes. This center could also be used for placement testing.

Studies have shown that low placement is a major factor in a student not completing a course of study. Last semester the math department took a look how the placement test works and this next semester we will be looking at implementing new cut scores for the placement test.



## **Program Context**

1. Mission: Please identify how your program aligns with the college's mission by selecting the appropriate check box(es):

✓Career Technical   ✓Basic Skills   ✓Transfer   ✓Lifelong Learning

If your program has a mission statement, include it here.

The mission of the Cañada Mathematics department is to provide a foundation for a liberal arts education and for the study of the sciences. This is accomplished by providing students with a broad range of courses designed to develop basic skills in computation and quantitative reasoning, to meet the transfer requirements for colleges and universities, and to meet the needs of occupational training programs.

2. Articulation: Describe how your program's articulation may be impacted by changes in curriculum and degree requirements at high schools and 4-year institutions. Describe your efforts to accommodate these changes.

There are several curricular changes that are taking place in California. The middle schools and high schools are changing their curriculum to meet Common Core, and the state academic senate is trying to standardize classes and CID descriptors. All of these changes will require us to modify our curriculum.

Research has shown that students are hurt by low placement. In response the math department has worked on our placement tests cut scores.

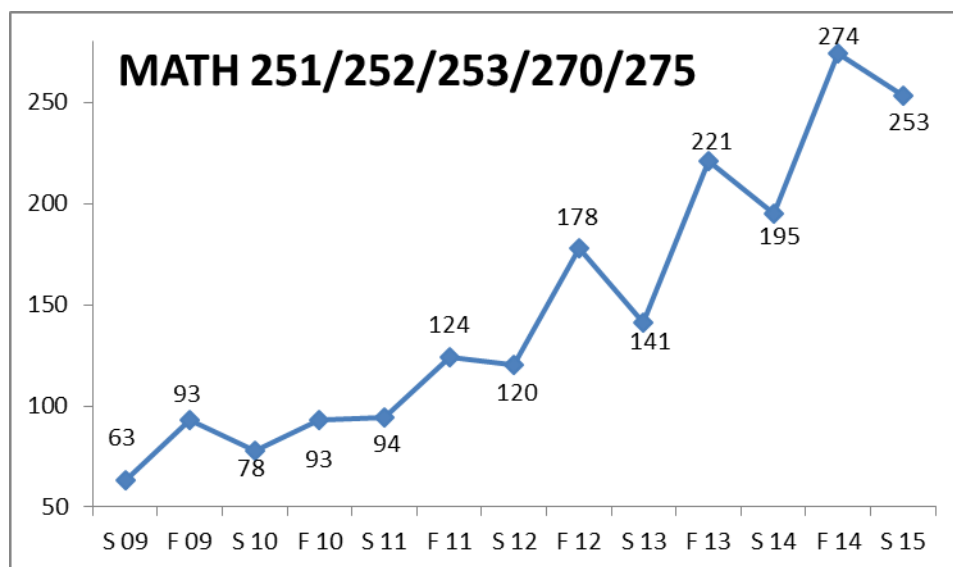
3. Community and Labor Needs: Describe how changes in community needs, employment needs, technology, licensing, or accreditation affect your program. CTE programs should identify the dates of their advisory group meetings.

N/A

## Looking Back

4. Curricular Changes: List any significant changes that have occurred in your program's curricular offerings, scheduling, or mode of delivery. Explain the rationale for these changes.

Our accelerated tracks, the fast track to calculus and StatPath have resulted in fewer students in Math 111, 112, 122, and 123, to the point where these are now only offered online and are likely to be eliminated from scheduling in the future. Enrollments in the calculus sequence continue to grow and we are now able to offer all of the classes every semester. We used to offer math 253, 270, and 275 in alternate semesters.



5. Progress Report: Provide your responses to all recommendations received on your last program review and report on progress made on previous action plans and toward your strategic goals.  
[Link: 2013-2014 Program Plan and Feedback forms](#)

The math department has participated in a number of professional development opportunities over the last year including participation in both campus-wide and statewide activities geared towards curriculum development and increasing student success.

Since 2013, Michael Hoffman and Denise Hum have been involved with Reading Apprenticeship and in December 2014 recruited a team of 8 STEM faculty to apply to be a part of the Reading Apprenticeship Community College STEM Network (RACCSN). Our team was selected as one of sixteen California Community Colleges in January with training to take place later this semester and during the summer. College of San Mateo and Skyline College also were selected to for the RACCSN so we will be collaborating with them on implementing RA in our classrooms and training other faculty members. Both Denise and Michael serve on the RACCSN Think Tank and meet regularly to develop, pilot, and adapt activities specifically for STEM disciplines.

For the past year, our second cohort of faculty including Ray Lapuz, Michael Hoffman, Yvette



Butterworth, and David Monarres are participated in 3CSN's California Acceleration Project to get trained in new pedagogies and further develop of Path to Statistics course. This class reduces the exit points for students and introduces them to statistical thinking which increases success in transfer-level statistics.

As co-chair of the ACES committee, Michael Hoffman is leading the campus-wide effort to focus on retention in classes particularly at the developmental level. A number of faculty from across disciplines as well as staff in student support services roles are working on projects to help retain our students and lead them to succeed. Michael also attended the year-long Leading From the Middle Academy to help facilitate this professional development.

Denise Hum continues to participate in the San Mateo County Regional Math Collaboration (formerly with Cal-PASS) to work with math faculty from our sister colleges and area high schools to continue to discuss Common Core State Standards, Mathematics and other articulation issues such as placement and assessment. Recent discussions have focused around aligning algebra curriculum in our district and determining what the new CCSSM algebra sequence entails and how it will impact our colleges.

Since the math department introduced a one-semester six unit accelerated pre-requisite to transfer level statistics, Path to Statistics, a new STEM path was introduced last year. The Fast Track to Calculus was offered three times as compressed trigonometry and pre-calculus, but beginning in Spring 2015, FT2C is now a single one-semester six unit class that satisfies the pre-requisite to Calculus I. This class is being further developed into an interdisciplinary, contextualized STEM math class that is tentatively planned to be offered in 2016.

6. Impact of resource allocations: Describe the impact to-date that each new resource (staff, non-instructional assignment, equipment, facilities, research, funding) has had on your program and measures of student success.

The math department has not received any new resources in the past year.



**Current State of the Program**

Data packets link <http://www.canadacollege.edu/programreview/datapackets1314.php>

7. Connection & Entry:

- A. Observation: Describe trends in program and course enrollments, FTES, LOAD and Fill Rates. Cite quantitative data and specific tables from the data packets.

FTES and fill rates have followed the overall college patterns. For 2013/2014, FTES was just over 542, up slightly from about 532 the previous year. Our annual course fill rates are typically in the mid to high 80's.

Our load has steadily decreased over the past few years as we have removed the Hours by Arrangement from our classes. This spring the last of the HBA's were removed. For 2013/2014, our LOAD was 586, down slightly from 594 the previous year.



**Productivity 2008/09 through 2013/14  
Mathematics (MATH)**

Productivity by Year

	Census Headcount	End of Term Headcount	FTEF	FTES	WSCH	Load	Sections	Max Enroll	Fill Rates
2009/10	3,045	2,303	21.27	525.27	15,758	741	94	3,514	88.7%
2010/11	3,212	2,306	23.40	577.08	17,312	740	99	3,630	88.5%
2011/12	3,463	2,639	25.27	523.82	15,715	622	104	3,875	89.4%
2012/13	3,449	2,644	26.88	532.09	15,963	594	105	3,841	89.8%
2013/14	3,434	2,647	27.73	542.08	16,262	586	107	3,978	88.3%

Productivity by Semester

	Census Headcount	End of Term Headcount	FTEF	FTES	WSCH	Load	Sections	Max Enroll	Fill Rates
Fall 2009	1,533	1,189	10.47	257.95	7,739	739	45	1,891	90.7%
Fall 2010	1,627	1,162	11.20	293.98	8,819	787	47	1,895	96.0%
Fall 2011	1,726	1,303	12.20	261.91	7,857	644	50	1,885	91.6%
Fall 2012	1,820	1,404	13.57	278.84	8,365	616	53	1,962	92.8%
Fall 2013	1,865	1,472	13.77	294.73	8,842	642	55	2,065	90.3%
Spring 2010	1,512	1,134	10.80	267.32	8,020	743	49	1,823	82.9%
Spring 2011	1,585	1,144	12.20	283.10	8,493	696	52	1,935	81.9%
Spring 2012	1,737	1,336	13.07	261.91	7,857	601	54	1,990	87.3%
Spring 2013	1,629	1,240	13.31	253.26	7,598	571	52	1,879	86.7%
Spring 2014	1,569	1,175	13.97	247.36	7,421	531	52	1,913	82.0%

- B. Evaluation: What changes could be implemented, including changes to course scheduling (times/days/duration/delivery mode/number of sections), marketing, and articulation that may improve these trends?

Our Dean has made many insightful changes to our course scheduling in order to maximize student access. While many, many students get help with math courses in the STEM Center each semester, we believe that the hiring of a full-time math instructional aid would be very beneficial



in terms of attracting and retaining students. If possible, we would also like to consider appropriate language support for the increasing numbers of foreign students who are taking math classes.

8. Progress & Completion:

- A. Observation: Describe trends in student success and retention disaggregated by: ethnicity, gender, age, enrollment status, day/evening. Cite quantitative data and specific tables from the data packets.

During the past 5 years, the overall success and retention rates have been held steady at around 57% and 78% respectively. Among various ethnicities, African American students continue to lag the average by about 10-15%.

**Retention and Success by Ethnicity**

		<b>Headcount</b>	<b>Success Count</b>	<b>Success Rate</b>	<b>Retention Count</b>	<b>Retention Rate</b>
2009/2010	African Am.	181	70	39%	134	74%
	Asian	272	180	66%	233	86%
	Filipino	92	54	59%	70	76%
	Hispanic	1,249	642	51%	964	77%
	Native Am.	16	6	38%	14	88%
	Unknown	483	273	57%	376	78%
	White	1,248	749	60%	984	79%
	<b>Totals &amp; Averages</b>	3,541	1,974	56%	2,775	78%
2010/2011	African Am.	188	59	31%	112	60%
	Asian	329	216	66%	261	79%
	Filipino	120	68	57%	92	77%
	Hispanic	1,451	648	45%	1,066	73%
	Native Am.	13	4	31%	9	69%
	Unknown	536	289	54%	419	78%
	White	1,201	751	63%	957	80%
	<b>Totals &amp; Averages</b>	3,838	2,035	53%	2,916	76%
2011/2012	African Am.	209	85	41%	155	74%
	Asian	325	216	66%	280	86%
	Filipino	93	58	62%	71	76%
	Hispanic	1,473	741	50%	1,135	77%
	Native Am.	16	7	44%	13	81%
	Unknown	639	357	56%	506	79%
	White	1,266	802	63%	1,043	82%
	<b>Totals &amp; Averages</b>	4,021	2,266	56%	3,203	80%
2012/2013	African Am.	202	89	44%	136	67%
	Asian	368	261	71%	313	85%
	Filipino	100	63	63%	77	77%
	Hispanic	1,560	775	50%	1,167	75%
	Native Am.	11	6	55%	8	73%
	Unknown	788	461	59%	617	78%
	White	1,331	905	68%	1,104	83%
	<b>Totals &amp; Averages</b>	4,360	2,560	59%	3,422	78%

There is no significant difference in performance between males and females. The age 18-22 group has by far the largest number of students. The group has success rate consistently at about 5% below the average. Success rate for first time students has trailed the rate for continuing students consistently by about 4% until 2013/2014, when the gap narrowed to 1%. Students attending evening classes continue to lag behind those attending day classes in both success and retention rates, by about 5% to 10%.

- B. Observation: For online courses describe any significant differences in the success and retention of students who are taking online courses compared to face-to-face courses.

The online courses success and retention rates are about 5% lower than the face-to-face courses.

- C. Evaluation: Based on these trends, what do you feel are significant factors or barriers influencing student success in your courses and program? What changes (e.g. in curriculum, pedagogy, scheduling, modality) could be implemented to improve these trends?

The exponential attrition process through the pre-collegiate course sequence is a significant barrier for student success. Students placing into low-level courses are much less likely to achieve their goals. We have recently started looking into the characteristics of our current math placement tests, with the intention of potentially changing the cut scores for various placement levels. This effort will continue in anticipation of the upgrade of our placement test software to “Compass 5” and the eventual adoption of the statewide Common Assessment Initiative.

We plan to further improve the already successful Math Jam program by examining existing data to compare the Math Jam population with the general student population, and designing a study on the impact of specific aspects/components of Math Jam.

We are planning a new “Math for STEM” course at the pre-calculus level to focus on the application of mathematics to other STEM disciplines, with the goal of enhancing students’ motivation and success rate.

9. SLO Assessment:

<https://smccd.sharepoint.com/sites/can/CANSLOAC/default.aspx>

- A. Are all course SLOs being systematically assessed at least once/4 years? Describe the coordination of SLO assessment across sections and over time.

The math department has set up a cycle in which SLO's for all classes are assessed at least once every two years. Below is a sample of how the SLO cycle is set up for math 110, 111, and 112. We have similar schedules for all of our classes.

### Math Department SLO Assessment schedule

SLO	Fall 2014	Spring 2015	Fall 2015	Spring 2016
<b>Math 110</b>				
SLO 1: Solve linear Equations				
SLO 2: Simplify Polynomials and rational expression				
SLO 3: Graph Lines				
SLO 4: Solve Quadratic Equations				
SLO 5: Systems of Equations				
<b>Math 111</b>				
SLO 1: Apply and solve linear equations				
SLO 2: Linear Graphs				
<b>Math 112</b>				
SLO 1: Simplify Polynomial and rational expressions				
SLO 2: Apply and solve Quadratic equations				

- B. Summarize the dialogue that has resulted from these assessments. What are some improvements in your courses that have been implemented through SLO assessment? How has student learning been improved by changes in teaching? Cite specific examples.

The biggest changes have been made in the elementary and intermediate algebra sequences. Realizing that we needed more time to cover the key ideas we moved some topics into other classes. For example, the logarithm properties are needed by STEM majors, but not by the majority of students who take math 120, so we moved that topic to Pre-Calculus where all of the STEM majors will see it. We just made this change the spring so we will see if the change improves student learning.





10. PLO Assessment:

PLO Assessment link [https://smccd.sharepoint.com/sites/can/prie/\\_layouts/15/start.aspx#/](https://smccd.sharepoint.com/sites/can/prie/_layouts/15/start.aspx#/)

- A. Describe your program’s Program Learning Outcomes assessment plans and results of direct and indirect assessments.

PLOs are assessed in Math 120, Math 200, and Math 253 which represent the culmination of the basic skills, transfer (non-STEM), and STEM tracks.

Program Report of Direct Assessments		
San Mateo CCCD		
CAN Dept - Mathematics		
Department Assessment Ray Lapuz Coordinator:		
SLOs	Means of Assessment & Success Criteria / Tasks	Results
CAN Dept - Mathematics - problem solving process - Students will use mathematical reasoning to solve problems and a generalized problem solving process to solve real-world problems.  SLO Status: Active	Assessment Method: Special program assessment tests will be given in all sections of Math 120, Math 200, and Math 252 to capture information about the remedial, transfer, and math major portions of our Program.  Assessment Method Category: Exam  Success Criterion: A passing score of 70% on at least 75% of the student tests	04/04/2014 - Test questions were scored on a 0, 1, 2, and 3 scale There were 77 students Score number 3 17 2 18 1 36 0 6  Result Type: Criterion not met Reporting Cycle: 2013 - 2014
CAN Dept - Mathematics - graphical representations - Students will demonstrate the ability to use symbolic, graphical, numerical, and written representations of mathematical ideas.  SLO Status: Active	Assessment Method: Special program assessment tests will be given in all sections of Math 120, Math 200, and Math 252 to capture information about the remedial, transfer, and math major portions of our Program.  Assessment Method Category: Exam  Success Criterion: A passing score of 70% on at least 75% of the student tests	04/04/2014 - Test questions were graded on a 0, 1, 2, and 3 scale  77 students tests were graded  score Number 0 22 1 11 2 38 3 6  Result Type: Criterion not met Reporting Cycle: 2013 - 2014

- B. Summarize the major findings of your program’s PLO assessments. What are some improvements that have been, or can be, implemented as a result of PLO assessment?

We did direct assessments of the PLOs in the Spring of 2014 with the results “criteria not met”. As a result we moved some topics out of math 120 and into math 222 allowing for more time to cover key ideas. We are also working to make sure students are placed correctly. We will do direct assessments of PLO’s again this spring.



## **Looking Ahead**

### 11. Strategic goal & action plans:

How will you address the opportunities for improvement that you identified above in Articulation, Community & Labor Needs, Connection & Entry, Progress & Completion and PLO Assessment? Identify timelines for implementation, responsible party, and resource requirements.

Action Plan	Timeline	Responsible party	Resources required
Further explore placement test	Spring 2014	All	None
Revision of algebra sequence	Fall 2015	All	None

Complete the Resource Request form to request instructional equipment, IT equipment, facilities, professional development, research, or funding (if needed) and submit with this form to your Division Dean.

Link to resource request form <http://www.canadacollege.edu/programreview/instruction-forms.php>