INSTRUCTIONAL PLANNING

Name of Program: Math
Author: Dan Morgali, Nancy Fetterman, Jennifer Cass
Date of Submission: 2/11/10

Division Dean: Wanda J. Dunn Date 2/11/10

Advisory Committee Chair: ___________________________ Date:
(Indicates review, if applicable)

Curriculum Committee Chair: __________________________ Date:
(For course and course requisite review)

CIP Review

Faculty Consultation: Name: _________________________ Date: ___

Community Consultation: Name: ______________________ Date: ___
(if applicable)

CIP Chair: Name: ___________________________ Date: ___

Recommendation Attached: ___ Yes

Faculty Senate President: Name: _________________________ Date: ___
(Indicates review by Senate)

Recommendation Attached: ___ Yes

Board Review Date: ___________________________
Mathematics Department
Instructional Planning Report
Spring 2010

I. Background and Analysis

A. Program Description

The Math Department plays an integral part in fulfilling the Cabrillo College mission. Moreover, the Math Department is central to Master Plan Goal A (Increasing the effectiveness of outreach and enhance enrollment), B (Enhance excellence in the classroom and student support services), and C (Provide pathways to prosperity through career technical education). The department offers courses leading to an associate degree and/or transfer to a four-year college/university, courses that fulfill requirements for occupational certifications and associate degrees, and courses in basic skills education for students needing preparation to succeed at college-level work. The Math Learning Center (MLC), the Watsonville Integrated Learning Center (ILC), and the Scotts Valley Center provide key student support services including free tutoring for all of our courses. The department offers 32 courses plus two courses in development ranging from Essential Mathematics (Arithmetic/Prealgebra) through Differential Equations and Linear Algebra. Sections are taught in Aptos, Watsonville, Scotts Valley, and online.

The Math Department is the largest component of the Natural and Applied Sciences Division (NAS), and accounts for approximately 12% of Cabrillo College’s total FTES. The department has 19 full-time and approximately 20 adjunct math faculty. There were 19 full-time and approximately 20 adjunct faculty five years ago at the last program plan. Thus, the department’s Fall 2004 Program Plan’s primary recommendation of replacing retiring full-time faculty and expanding the overall number of full-time faculty has not been met. This remains the department’s primary recommendation. Moreover, the department is moving further away from the AB 1725 goal of 75% of units being taught by full-time faculty. In Spring 2008, there were 270 units taught by contract faculty, 42.75 full-time overload units and 160.25 adjunct units. Thus only 57% of the units taught were taught by full-time faculty. Having enough full-time instructors is a necessity in implementing Goal B of the Master Plan to enhance excellence in the classroom as well as fulfilling the College mission.

Most math sections are offered in the traditional classroom-based lecture/discussion mode, with one course delivered using computer-mediated instruction in a lab setting. The department has worked steadily at increasing its online offerings, both in number of courses and number of sections offered. Due to the current budget situation, the department has chosen to reduce the number of online sections but continues to offer courses in support of the college goal of offering an online degree. The Math Department has worked to offer as many sections as possible at the Watsonville Center and in Scotts Valley. The department is working hard at the Master Plan Goal A of increasing outreach and enrollment through trying to reach students who have difficulty taking classes at the Aptos Campus.

The MLC has one 10-month 100% LIA, one 9-month 80% LIA, one 9-month 75% LIA, two 9-month 50% LIAs, and approximately 15 student tutors. The ILC has one 10-month 100% LIA
and the Scotts Valley Center has one 40% 9-month hourly LIA. Every semester an average of 4000 students are enrolled in mathematics and 1600 use the MLC. A thriving MLC is inherent to the Master Plan Goal B of enhancing student support services as they relate to Math.

The Math faculty is very active in shared governance with many department members serving on campus-wide committees, often in leadership roles. Also, many faculty teach overloads in addition to their participation in shared governance. This coupled with not enough full-time faculty puts an even greater burden on the department in fulfilling our departmental tasks. Math is fortunate to have many adjunct instructors who actively participate in department and campus-wide activities in addition to their excellent teaching.

B. Relationships

Math’s relationships with other programs are too many to list; Math curriculum supports AA and AS degrees, a number of Cabrillo’s certificate and vocational programs, and university transfer and graduation mathematics requirements for students in many majors. The Mathematics Department provides strong, broad-based support for the students and faculty in science and engineering programs. The mission of the Mathematics, Engineering, and Science Achievement program (MESA) is closely aligned with that of Math. Students get support from the Learning Skills program. The department is involved through individual faculty members with the basic skills program Academic Community for Educational Success (ACES), the Digital Bridge Academy (DBA), and the Title V grant, Students Transitioning in Academics: Reinforcing Success (STARS).

The Math program is continuing efforts to articulate with the local high schools. Articulation agreements for the Cabrillo College AA degree in Mathematics are in place with UC Santa Cruz, UC Berkeley, CSU San José and CSU San Francisco.

C. Costs

The 2008/09 statistics on productivity, revenue and costs of the Mathematics Program reproduced below are taken from the 2008/09 Cabrillo College Fact Book. The math program’s productivity and efficiency/profitability are consistently well above the college average.

The table below quantifies that Math has greater productivity than the college at large for every term in the Fact Book.

<table>
<thead>
<tr>
<th>PRODUCTIVITY: WSCH/FTEF</th>
<th>Semester</th>
<th>FA04</th>
<th>SP05</th>
<th>FA05</th>
<th>SP06</th>
<th>FA06</th>
<th>SP07</th>
<th>FA07</th>
<th>SP08</th>
<th>FA08</th>
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<tbody>
<tr>
<td>Math</td>
<td>613.1</td>
<td>574.2</td>
<td>615.0</td>
<td>521.0</td>
<td>542.5</td>
<td>526.4</td>
<td>602.5</td>
<td>572.4</td>
<td>653.3</td>
<td>699.8</td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>551.0</td>
<td>533.1</td>
<td>552.1</td>
<td>512.0</td>
<td>518.2</td>
<td>491.8</td>
<td>532.3</td>
<td>515.8</td>
<td>610.3</td>
<td>609.3</td>
<td></td>
</tr>
<tr>
<td>Ratio (M/C)</td>
<td>111%</td>
<td>108%</td>
<td>111%</td>
<td>102%</td>
<td>105%</td>
<td>107%</td>
<td>113%</td>
<td>111%</td>
<td>107%</td>
<td>115%</td>
<td></td>
</tr>
</tbody>
</table>
The FTES revenue generated by the mathematics class offerings as a percentage of the college FTES is shown below along with the cost of the program as a percentage of the budget for instruction. The category Return represents Revenue/Cost given as a percentage.

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>11.007%</td>
<td>11.674%</td>
<td>11.706%</td>
<td>11.758%</td>
<td>11.873%</td>
</tr>
<tr>
<td>Cost</td>
<td>9.197%</td>
<td>9.225%</td>
<td>9.077%</td>
<td>8.986%</td>
<td>9.112%</td>
</tr>
<tr>
<td>Return</td>
<td>120%</td>
<td>127%</td>
<td>129%</td>
<td>131%</td>
<td>130%</td>
</tr>
</tbody>
</table>

In summary, math remains one of the most productive and profitable programs at Cabrillo College. Traditionally, this is true due to high demand resulting in large classes and very low overhead. In fact, when the college looks to expand enrollment, more sections of Math could be filled provided there is the space and faculty to teach them. However, it is disturbing that some of the cost efficiency of the Math program is due to over-enrolled classes and a disproportionate number of sections being taught by adjuncts/full-time faculty working overloads. Historically, a return of 120%-125% is expected. A return of 130% indicates that the department is heavily burdened.
D. Student Success

The following table shows data on student retention and success for the mathematics program and the college at large from the 2008 Fact Book.

<table>
<thead>
<tr>
<th>RETENTION AND SUCCESS RATES</th>
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<tbody>
<tr>
<td>Retention (Math)</td>
</tr>
<tr>
<td>Retention (College)</td>
</tr>
<tr>
<td>Success (Math)</td>
</tr>
<tr>
<td>Success (College)</td>
</tr>
</tbody>
</table>

The retention rate in Math is, on average, approximately eight percentage points lower than the college at large. This is consistent with data from the previous program plan. Due to many factors including over-enrolled classes, substandard preparation, the sequential nature of the content, and anxiety, math courses at Cabrillo, and other institutions, have a lower rate of retention than the typical course. We are currently asking the Planning and Research Office (PRO) to investigate how the math retention rate at Cabrillo College compares to other community colleges in California and across the country.

The department was very concerned to see a downward trend in success. While success rates that are lower than the college at large are to be expected in Math due to many of the same factors that influence retention, such a downward trend is alarming. Therefore, the department put together a committee to work with the college Planning and Research Office (PRO) to examine this. The committee had many ways they wanted to parse out the data for analysis. Rick Fillman in Research forwarded the relevant data set and instructed the committee on using pivot tables to isolate the specific data desired. The committee discovered that success in online math courses is consistently around 39%. Research from Francine Van Meter, Director of the Teaching and Learning Center (TLC), shows that this rate of success is typical of, and slightly better than,
success rates for online math courses elsewhere. Online math faculty frequently attend
conferences and workshops which share pedagogical innovations intended to improve online
success.

The department has expanded its online course offerings and online enrollment has increased.
This has led to a proportional drop in overall success. Looking at traditionally taught Math
courses only, the success rate is about 55% for 2005-2008. This, coupled with an overall college-
wide drop of 1% over the same time period, seems to explain the drop in success in Math. The
committee will remain intact and further pursue trends in student success. Summer and winter
success rates are consistently higher than fall/spring rates possibly because the students are
focused on one class and seem to be highly motivated. Striving for the highest rate of success
possible, in traditional and online courses, without compromising standards, is a top priority of
the Math Department.

Since the last program plan, Math has created four courses designed to raise success rates and to
improve student learning in Intermediate Algebra (Math 152) and Precalculus (Math 4). Because
it is required for AA and AS degrees as well as for transfer-level Math courses, Math 152 is
taken by a large number of students with vastly different backgrounds and goals. A two-semester
alternative, Math 152A & Math 152B, has been added to the curriculum to help those students
who found the pacing of the one semester course too fast. And because of historically bad
success rates and a concern about students achieving a sufficient depth of understanding for
success in the calculus series (Math 5ABC), a two-semester alternative to Math 4, Math 2
(Precalculus Algebra) and Math 3 (Precalculus Trigonometry), was developed. We have been
requested to do a longitudinal study examining success rates in these courses. We plan to do this
within the department as data becomes available.

Math has also updated the student units for the existing Prealgebra courses (Math 254A, Math
254B, and 254CM) to accurately reflect the time in class and the methods of presentation.

The low success rates in math continue to be a national problem, and Math faculty at Cabrillo are
researching and implementing ways of improving basic skills education. Improved basic skills
lead to improved success at the transfer level and in occupational and technical courses.
Department members have developed numeracy courses, are looking at accelerated math
programs and contextualized mathematics, and are incorporating learning skills instruction into
their courses. Faculty members will continue to work with DBA, ACES, and STARS toward this
goal. Improved basic skills relates both to the college mission and to the Master Plan Goal C to
enhance career technical education.

The MLC, the ILC, and the Scotts Valley Center are primary resources for supporting Math at all
levels and are critical to the success of many students. Resources that go to these support centers
have a very tangible effect on student success. For many students, math is a struggle. Any
impediments such as having to wait too long for a tutor or a seat at a table can add incredibly to
this struggle. Conversely, being welcomed into a comfortable environment where one can get
quick answers to questions or in depth help can facilitate success. Some of the LIA positions are
funded by the Basic Skills Initiative (ACES). Twenty-five percent (25%) of one of the LIA
positions in the MLC and all of the 40% LIA position used at the Scotts Valley Center will likely
be terminated at the end of this fiscal year due to state cut-backs in categorically funded programs such as ACES. Part of the Watsonville LIA position may also be in this group.

Though MESA is not part of the Math Department, it plays a similar role to the MLC for students in transfer-level mathematics who are majoring in math, engineering, and science. Math and MESA continue to have a very close association. Several full-time faculty helped develop a summer class, funded by MESA’s National Science Foundation grant, to prepare students for Precalculus.

E. Student Learning Outcomes and Student Success

Student Learner Outcomes (SLOs) were approved by the department for all courses before submitting them to Curriculum in Spring 2009. All instructors now include SLOs on each course syllabus. Because most courses did not have SLOs previously, the Math Department has only been able to assess one outcome per course. Most full-time faculty and many adjuncts participated in the assessments. Each SLO assessed related to the modeling and solving of application problems. Each instructor used a question from a previous exam for their assessment tool. While applications are difficult for students at all course number levels, most results showed that success is best achieved through clearly stating expectations, explaining grading rubrics, and emphasizing the importance of applications. Many saw a strong link between success on the specific application and success in the course overall. The complete results of these assessments are included in Appendix B. The department has adopted the Revolving Wheel of Assessment and will keep with that time line for assessment.

The department has assessed each of the Core 4 competencies. The results of these assessments are included in Appendix B. Again, both full-time faculty and adjunct faculty participated in the assessments. The primary tool for assessment remained previous exam questions. While all of Math’s courses support the Core 4 competencies, each instructor chose a specific competency and a specific course to evaluate. For Communication, all Math classes require the ability to interpret both written and graphical information and to clearly communicate an answer. Critical Thinking and Information Competency are absolute necessities in all Math classes. The assessment showed that analysis, computation, and problem solving are indeed central to success in math. Some classes such as Math 12 (Statistics) also support the research component of Critical Thinking and Information Competency. The Global Awareness competency is achieved predominantly through application of the scientific method. Some individual instructors also incorporate global systems with problems that are environmental or emphasize integrated systems. For Personal Responsibility and Professional Development, instructors agreed that self-awareness is a necessity to deal with the depth and breadth of the material that students encounter and the challenging nature of math for many students. Here, instructors often assessed something with a deadline or required attendance rather than an exam question. Workplace Skills are also necessary for success in math. Students must be dependable, reliable and accountable while meeting deadlines and completing tasks.

The Math Department appreciates the dialogue that has emerged from the assessments of both our SLOs and the Core 4.
F. Results of Student Surveys

The survey was given to students in Fall 2008. Out of 159 students, 59% were female and 41% were male. Sixty-one percent (61%) were under 21 years of age, 25% were between 21 and 25 and 10% were between 26 and 30, 1% were between 31 and 40, and 3% were over 40. Of these students, only 3% were math majors. Although 50% of students are taking math courses because it is a program requirement, only 8% would not recommend math courses to other students. Seventy-three percent (73%) of students prefer taking classes in the morning and 24% in the afternoon. Eighty-nine percent (89%) felt the overall workload assigned was appropriate and 94% thought that the course outline provided by the instructor accurately reflected what was actually taught in class. So, although most students are taking math courses because it is a requirement or pre-requisite, they are satisfied with their math courses. The advice from counselors was deemed excellent or satisfactory by 72%. This is a substantial increase from only 39% on the Fall 2002 survey. The effort between Math and Counseling to improve communication has paid off.

From the written comment portion of the same survey, the faculty remain the number one strength. Students praise their ability, their availability, and their level of caring. Student support services, headed by the MLC, their tutors, and MESA, rank second. Students have a genuine appreciation for the free tutoring provided as well as for the access to calculators and textbooks.

The most common suggestions for improvement regard the Math Learning Center. Students want the MLC open for more hours, with more tutors and more space. An additional LIA position in the MLC would support these requests. The campus proctoring center, funded by the Disabled Students Programs and Services department (DSP&S), has helped to relieve some of the test proctoring space demands at the MLC, but again, due to state cut-backs in categorically funded programs such as DSP&S, it will be moving to the Assessment Office and most likely decreasing its services at the end of this fiscal year.

The second most common improvement students wanted in 2002 was regarding the facilities. Since then, many rooms in the 700 building have been updated with new desks, room 711 is a ‘smart room’, and the heating and ventilation was overhauled in 2004. In the 2008 survey there were no suggestions for improvements to facilities. Another improvement students wanted was regarding the cost of textbooks. The department has tried to address this by developing a customized version of one of our intermediate algebra texts so that new editions will not be required as often. This increases the potential to buy used books and to resell texts. Texts are also available for use at the MLC, the ILC, and the library.

Separate student surveys were conducted for online classes. Of 90 students surveyed, there were no Math majors. The students were 75% female. Another noteworthy difference is that 34.6% were 31 or older compared to 4% for the in-class survey. Clearly, female students and older students make up a greater proportion of the online students. Written comments on the strengths of the Math courses offered online consistently focused on the excellent instructors, resources such as the MLC, and the great appreciation the students have for the opportunity to take the courses online. Most of the suggestions for improvement focused on heavy workload and wanting more resources/extended hours at the MLC. Many students requested more online
courses in Math. There also are those who seem to have determined that online is not the
medium for them. Students who require more time with an instructor or have problems learning
on their own are not good candidates for success in online math classes.

G. Results of External Data

The need for qualified workers in areas requiring math and science is more pressing than ever.
The external data indicates that these jobs will continue to be in high demand and that workers in
these fields are well compensated.

The department chose five occupations that our program prepares students to enter: civil
engineer, financial analyst, computer software engineer, registered nurse, and environmental
scientist and specialist, including health. Job growth for each is predicted to be 5.6%, 40.0%,
15.6%, 21.5% and 20.0%, respectively, over the ten years from 2006-2016 for Santa Cruz
County. The median incomes of these five occupations average $75,000 compared with an
overall county median of $35,000. The numbers for the state echo this data, with even more
demand and higher income.

The five occupations chosen are just five of many where ability to understand math and science
is the barrier that keeps demand so high even though the compensation is disproportionately
good. To have a properly prepared workforce, for the good of the individual and society, math
and science have to be emphasized.

II. Program Recommendations and Goals

The following recommendations are necessary to maintaining and improving the quality of our
program. These are NOT listed in order of priority.

A. Staffing

1. Replace the three full-time faculty positions lost to retirement and resignation.
   The number of full-time faculty in the mathematics department has decreased by
   three positions in the last two years. Due to the budget situation, we have not been able to
   replace these positions. We have also lost adjunct faculty for various reasons, including
   full-time positions at other colleges, and as a result, have had to hire more adjunct
   faculty. We now have only 19 full-time faculty, including the Math Learning Center
   coordinator, and 28 adjunct faculty. In Fall 2009, we taught 4222 students, a slight
   increase in the number of students over Fall 2008, with 4 fewer sections. The faculty are
   taking more students per section than is recommended for best practice, as noted in the
   AMATYC publication, Guidelines For Mathematics Departments At Two-Year Colleges,
   especially in our developmental classes. To continue to provide high quality instruction,
   replacing these three faculty positions is critical. Unavailability of qualified and
   experienced adjuncts combined with strong student demand leads to lower program
   quality, inconsistency in sequential courses, and an over-burdening of full-time faculty.
Also, contract faculty play a pivotal role in curriculum development and departmental leadership. Finally, supporting and assessing the SLOs requires a level of commitment and institutional knowledge that may not come with adjunct faculty.

Cost: $29,000/full-time faculty per year
($80,000 – 30 units x $1700/unit (including benefits) = $29,000)

2. **Hire a full-time LIA for the Math Learning Center (MLC).**

   To better meet the needs of students, we need to expand the hours of the MLC by adding one more full-time LIA position for the MLC. As noted earlier, the MLC provides invaluable services to students and is used heavily, as evidenced by the data, yet the lack of tutors and available hours limits students’ ability to get the needed assistance from the MLC. (Mentioned in assessments of Core II and Core IV.)

   Cost: $41,000/full-time LIA position per year, which would allow for the expanded hours, plus the cost of having the facility open more hours.

3. **Increase the number of tutors for the Integrated Learning Center (ILC).**

   To continue with the quality of support that we give our students, we need to increase the number of math tutors at the ILC. The ILC assists students with all levels of math; however, with the 27 percent increase in the number of students that use the Center for math, student access to tutors is limited. (Mentioned in assessments of Core II and Core IV.)

   Cost: $1,720 per semester, which would allow for 10 extra tutor hours per week for 16 weeks of tutoring.

B. **Facilities (Space)**

4. **Increase the number of group-study rooms and general space in the MLC and the ILC.**

   To better support the 1400 to 1600 students per semester served by the MLC, and increase student success, we need to increase the number of group study rooms and overall space at the MLC. The AMATYC publication, *Beyond Crossroads*, references the textbook, *Winning at Math*, by Dr. Paul Nolting, which documents the importance of study groups in improving student success. To encourage study groups, we need to have available group study rooms to accommodate the students. These rooms could also be used as quiet rooms, tutor training rooms, and rooms for proctoring exams.

   Cost: Varies with remodel costs. Nearby rooms could be used as they become available once construction of new facilities is completed, within the parameters of the space reallocation process.
5. **Increase the classroom space at high-demand times.**

   To maximize enrollment, and in the future, increase sections, the math department needs more classroom space at the high-demand times. Seventy-three percent (73%) of the students surveyed said that they prefer to take math classes in the morning. More sections could be offered and filled if the classroom space and instructors were available.

   **Cost:** This is more of a prioritization than a cost. Once construction is completed, the rooms should be available.

6. **Increase the adjunct office space.**

   To facilitate interaction with students, more adjunct office space is needed. We currently have 28 adjunct faculty with one office of about 170 square feet. In that room are four four-drawer file cabinets, four desks/tables, one bookcase, and four computers. Most full-time instructors have a large enough office to allow them to do their work and meet with students, but 28 adjuncts share one office. It can be very difficult to meet with students when there are high levels of congestion and traffic, let alone respect student confidentiality. Also, two full-time offices are situated so that they require one to go through the adjunct office to get to them. As we ask more and more of our adjuncts, we need to provide them with the best tools for student success. To try to relieve this situation, we are going to schedule adjunct faculty office hours into the offices of full-time faculty willing to share their office space.

   **Cost:** Again, this is more of a prioritization than a cost. Once construction is completed, the rooms should be available. Some remodeling could be necessary.

C. **Policies**

7. **Encourage membership in professional organizations.**

   To improve the quality of our teaching, enhance professional development, and improve student success, we would like to increase the membership and participation of our faculty, both full-time and adjunct, in our professional organizations, such as the American Mathematical Association of Two-Year Colleges (AMATYC) and the California Math Council of Community Colleges (CMC³). Each of these organizations has an annual conference. The CMC³ conference is in Monterey while the AMATYC conference can be anywhere in the United States or Canada. While some department members belong to these organizations, membership has waned and conference attendance has dropped. It is important to be current and to share ideas and approaches with colleagues from other colleges. In an attempt to resolve this issue, we are trying a couple of things. First, those who have attended conferences are sharing their experiences with the department, and second, we are e-mailing the department with the necessary information on how to join the various professional organizations, especially CMC³ since it is our state affiliate and its conference is local. (Mentioned in assessments of Core II and Core III.)

   **Cost:** None.
8. **Fully implement a written mentoring process adapted to the Math department.**

   To improve the quality and consistency of instruction, we would like to adapt the current college formal mentoring program to the math department for both contract and adjunct faculty. Currently the math department does have course pacings, syllabi, and sample exams for various math courses available for faculty on the O-drive, but not all faculty use this information. New faculty members are assigned full-time instructors as mentors for various courses. It is often up to the new instructors to seek their assistance. There also is a lot of sharing of information through instructor websites. However, there is still a need to create clearer guidelines for the mentor. ( Mentioned in assessments of Core II, Core III, and in SLO assessments of Applied Problems.)

   **Cost:** None.

9. **Support and eventually expand the online program.**

   To support student access through distance education and the college goal of offering an online degree, we would like to consistently schedule online sections and possibly expand the number of courses available with an expansion of teaching units. Due to the extreme budget situation, online offerings have been pared back. Though the department has concerns about the rates of success, the access provided by online courses mitigates these concerns. For the instructors who develop and teach online courses and the students who rely on them, there needs to be an assurance that distance education will be available next semester, next year, etc.

   **Cost:** There needs to be an increase of teaching units.

10. **Offer Math classes in winter session and summer session.**

    To support access and success in mathematics, summer session and winter session should be held and offer a consistent variety of math courses. As mentioned before, success rates for summer and winter are higher (by about 15%) than success rates in fall/spring, possibly because the students are focused on one class and seem to be highly motivated. Moreover, many students have a series of math courses to complete. Not having winter or summer math courses available can add a year of study before transferring to a four-year institution.

    **Cost:** There are facilities costs as well as instructor compensation. There needs to be an increase of teaching units.

11. **Improve communication with local high school, two-year college, and four-year college math departments.**

    Over the years, the Math department has met with our colleagues at local high schools, UCSC, CSUMB and other schools. However, the amount of communication varies and often is performed by a few individuals addressing specific topics. Improved communication would lead to better articulation and smoother transitions for students, leading to improved student success. Anything from having informal mixers to arranging scheduled meetings would help to establish/cement relationships and facilitate further communication between departments.

    **Cost:** None.
III. Attachments

- Appendix A: Prioritized Recommendations and Goals
- Appendix B: SLO/Core Competency Assessments
- Appendix C: Curriculum and Model Program Review
- Appendix D: Weblink to College Catalog pages
- Appendix E: Articulation Agreements
### Appendix A

**Math Program Plan 2010**

**Prioritized Recommendations and Goals**

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Replace the three full-time faculty positions lost to retirement and resignation.</td>
<td>$29,000/position</td>
</tr>
<tr>
<td>2.</td>
<td>Hire a full-time LIA for the Math Learning Center (MLC).</td>
<td>$41,000 + facilities costs</td>
</tr>
<tr>
<td>3.</td>
<td>Increase the number of group-study rooms and general space in the MLC and the ILC.</td>
<td>TBD</td>
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<tr>
<td>4.</td>
<td>Increase the number of tutors for the Integrated Learning Center (ILC).</td>
<td>$1,720 per semester.</td>
</tr>
<tr>
<td>5.</td>
<td>Increase the adjunct office space.</td>
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<tr>
<td>6.</td>
<td>Fully implement a written mentoring process adapted to the Math department.</td>
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<tr>
<td>7.</td>
<td>Increase the classroom space at high-demand times.</td>
<td>TBD</td>
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<td>8.</td>
<td>Offer Math classes in winter session and summer session.</td>
<td>More teaching units.</td>
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<tr>
<td>9.</td>
<td>Support and eventually expand the online program.</td>
<td>More teaching units.</td>
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<tr>
<td>10.</td>
<td>Encourage membership in professional organizations.</td>
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</tr>
<tr>
<td>11.</td>
<td>Improve communication with local math departments.</td>
<td>None</td>
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## Appendix B
### SLO and Core 4 Assessment Results

#### Transfer and Basic Skills

**Departmental Assessment Analysis Form**

### SLO ASSESSMENT

<table>
<thead>
<tr>
<th>Department</th>
<th>Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Date</td>
<td>8/27/09</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>FULLTIME</th>
<th>ADJUNCT</th>
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<tbody>
<tr>
<td>Number of Faculty/Staff participating in dialogue</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>Number of Faculty/Staff sharing Assessment Results</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>Total number of faculty/staff in department</td>
<td>19</td>
<td>25 – 30</td>
</tr>
</tbody>
</table>

### Core Competency or Course SLOs measured

- SLOs pertaining to applied problems (Each math course has an SLO related to the modeling and solving of applied problems.)

### Assessment Tools

- Instructors used an applied problem from the final exam used in one of their Spring 2009 classes. Due to the large number of people sharing assessments, the department formed groups for prealgebra/basic algebra, intermediate algebra, and transfer. The groups then reported back for discussion from the entire department.

### Assessment Results

- Students still struggle disproportionately with applied problems versus strictly computational problems. This is particularly true at the basic skills level.
- Many students need improved reading comprehension.
- Some instructors are seeing improved results. Many students got the problem exactly right. The instructors attribute this to explaining their grading rubric clearly and placing an emphasis on applied problems in class, on out-of-class assignments, and on exams.
- Many students do not even attempt applied problems, especially at the basic skills level.
| Next Step in the Classroom to Improve Student Learning | o State goals or objectives of assignment/activity more explicitly  
| How might student performance be improved? | o Revise content of assignment/activities  
| Check all the items faculty/staff felt would help them address the needs and issues that were revealed by the assessment. | o Increase in-class discussions and activities  
| | o State criteria for grading more explicitly  
| | o Nothing; assessment indicates no improvement necessary (opinion of some instructors)  
| Next Step in the Department to Improve Student Learning | o Encourage faculty to share activities that foster competency  
| Check all that the department felt would help them improve student learning. | o Visit classrooms to provide feedback (mentoring)  
| | o Ensure that new faculty, especially adjuncts, understand the importance of SLOs and emphasize applied problems  
| Priorities to Improve Student Learning | • Instructors should establish grading rubrics and emphasize the rubrics/expectations with their students  
| (List the top 3-6 things faculty/staff felt would most improve student learning) | • Instructors should emphasize applications in class, on homework, and on exams.  
| | • Instructors should encourage students to complete all of the homework and attempt all problems on exams and quizzes  
| Implementation | The department has monthly meetings. Ongoing discussion of the above topics occurs at most meetings.  
| (List the departmental plans to implement these priorities) |  
| Timeline for Implementation | Immediate. Assessment will follow the ‘revolving wheel.’  
| (Make a timeline for implementation of your top priorities) |
## Transfer and Basic Skills
### Departmental Assessment Analysis Form

### COMMUNICATION COMPETENCY (CORE I) ASSESSMENT

<table>
<thead>
<tr>
<th>Department</th>
<th>Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Date</td>
<td>10/16/09</td>
</tr>
</tbody>
</table>

- Number of Faculty/Staff participating in dialogue
- Number of Faculty/Staff sharing Assessment Results
- Total number of faculty/staff in department

<table>
<thead>
<tr>
<th></th>
<th>FULLTIME</th>
<th>ADJUNCT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>25 – 30</td>
</tr>
</tbody>
</table>

### Core Competency or Course SLOs measured

- Communication Competency (Core Competency I)

### Assessment Tools

- Four instructors used their Spring 2009 final exam.
- Two used a quiz from Fall 2009. The classes represented were Math 254B, 154, 152, 12 (twice), and 18.

### Assessment Results

- The results were mixed. One instructor had 100% of students passing the assessed problem. Another had 50% blank answers. The others were somewhere in between.
- It can be difficult to get students to attempt questions that require reading comprehension and interpretation.
- The vast majority of students who passed the final/class did well on the assessment.
- Even if students have done a problem correctly, they will often misstate the answer or not state it at all.
| Next Step in the Classroom to Improve Student Learning | State goals or objectives of assignment/activity more explicitly  
Revise the amount of writing/oral/visual/clinical or similar work  
Revise activities leading up to and/or supporting assignments/activities  
Increase in-class discussions and activities  
Increase guidance for students as they work on assignments  
Use methods of questioning that encourage the competency you measured  
State criteria for grading more explicitly  
Place a greater point emphasis on the stated conclusion of an applied problem, especially in hypothesis testing |
| --- | --- |
| Next Step in the Department to Improve Student Learning | Encourage faculty to share activities that foster competency  
Analyze course curriculum, so that the department can build a progression of skills as students advance through courses  
Other (please describe) Ensure that new faculty, especially adjuncts, understand the importance of SLOs and emphasize applied problems  
Nothing: assessments indicate no improvements necessary (opinion of some instructors) |
| Priorities to Improve Student Learning | Increase supervised/instructor guided practice of writing complete answers in class.  
Analyze curriculum to ensure a progression of communication skills.  
State goals and expectations more explicitly. |
| Implementation | Curriculum discussions will continue at monthly department meetings.  
Departmental discussion and collaboration on successful practices will continue at department meetings and during Flex Week activities. |
| Timeline for Implementation | Implementation will be both immediate and continuing. Assessment will follow the ‘revolving wheel’. |
## Transfer and Basic Skills
Departmental Assessment Analysis Form

### CRITICAL THINKING AND INFORMATION (CORE II) ASSESSMENT

<table>
<thead>
<tr>
<th>Department</th>
<th>Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Date</td>
<td>8/27/09 and 10/16/09</td>
</tr>
<tr>
<td>Number of Faculty/Staff participating in dialogue</td>
<td>19 FULLTIME 16 ADJUNCT</td>
</tr>
<tr>
<td>Number of Faculty/Staff sharing Assessment Results</td>
<td>17 11</td>
</tr>
<tr>
<td>Total number of faculty/staff in department</td>
<td>19 25-30</td>
</tr>
<tr>
<td>Core Competency or Course SLOs measured</td>
<td>Critical Thinking and Information Core Competency (Core II)</td>
</tr>
<tr>
<td>Assessment Tools (Give examples of major assignments your faculty/staff used to measure the competency or course SLOs)</td>
<td>Instructors used their Spring 2009 final exam for one class for the 8/27/09 meeting. Because this discussion was originally focused on applications SLOs, the department revisited the discussion for the closely related competency of critical thinking. In addition, three adjunct instructors shared new assessments for Math 254 on 10/16/09.</td>
</tr>
<tr>
<td>Assessment Results (Summarize the overall results of your department)</td>
<td>Critical thinking, especially analysis and problem solving, is difficult for many students. This is true for all course number levels. Students don’t attempt or don’t complete problems that appear complex to them. There were no overall areas where the student performance was outstanding. Critical thinking and problem solving are the most difficult aspects of teaching math well, and most students need to achieve these skills incrementally. It is paramount that students attain the appropriate level of skill with each course and that instructors hold students accountable for the skills they have previously attained as it applies to their current course.</td>
</tr>
<tr>
<td>What student needs and issues were revealed?</td>
<td></td>
</tr>
<tr>
<td>Were there any areas where student performance was outstanding?</td>
<td></td>
</tr>
<tr>
<td>Any areas where it can be improved?</td>
<td></td>
</tr>
<tr>
<td>Next Step in the Classroom to Improve Student Learning</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>How might student performance be improved?</td>
<td></td>
</tr>
<tr>
<td>Check all the items faculty/staff felt would help them address the needs and issues that were revealed by the assessment.</td>
<td></td>
</tr>
<tr>
<td>• Increase in-class discussions and activities</td>
<td></td>
</tr>
<tr>
<td>• Use methods of questioning that encourage the competency</td>
<td></td>
</tr>
<tr>
<td>• State criteria for grading more explicitly</td>
<td></td>
</tr>
<tr>
<td>• Increase interaction with students outside of class</td>
<td></td>
</tr>
<tr>
<td>• Ask a colleague to critique assignments/activities</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Next Step in the Department to Improve Student Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check all the department felt would help them improve student learning.</td>
</tr>
<tr>
<td>• Encourage faculty to share activities that foster competency</td>
</tr>
<tr>
<td>• Ensure that new faculty, especially adjuncts, emphasize applied problems</td>
</tr>
<tr>
<td>• Ensure that students do not pass courses without achieving the critical thinking competency at each course number level</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Priorities to Improve Student Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>(List the top 3-6 things faculty/staff felt would most improve student learning)</td>
</tr>
<tr>
<td>• Instructors should emphasize applications in class, on homework, and on exams.</td>
</tr>
<tr>
<td>• Instructors should encourage students to complete all of the homework and attempt all problems on exams and quizzes.</td>
</tr>
<tr>
<td>• Encourage students to get extra help with problems relating to critical thinking and analysis outside of class through the instructor, MLC, MESA, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Support an increase in the number of tutors in the MLC and hours of availability.</td>
</tr>
<tr>
<td>• Increase faculty mentoring.</td>
</tr>
<tr>
<td>• Discuss student success at department meetings, at conferences, and during Flex Week.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Timeline for Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate and on going.</td>
</tr>
</tbody>
</table>
## Transfer and Basic Skills Departmental Assessment Analysis Form

### GLOBAL AWARENESS (CORE III) ASSESSMENT

<table>
<thead>
<tr>
<th>Department</th>
<th>Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Date</td>
<td>10/16/09</td>
</tr>
<tr>
<td>Number of Faculty/Staff participating in dialogue</td>
<td>FULLTIME</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Number of Faculty/Staff sharing Assessment Results</td>
<td>5</td>
</tr>
<tr>
<td>Total number of faculty/staff in department</td>
<td>19</td>
</tr>
<tr>
<td>Core Competency or Course SLOs measured</td>
<td>Global Awareness Core Competency (Core III)</td>
</tr>
<tr>
<td>Assessment Tools (Give examples of major assignments your faculty/staff used to measure the competency or course SLOs)</td>
<td>Instructors used homework, quizzes, exams, and projects involving hypothesis testing. The competency is predominately achieved through application of the scientific method in statistics.</td>
</tr>
<tr>
<td>Assessment Results (Summarize the overall results of your department)</td>
<td>80% of students showed competency in hypothesis testing.</td>
</tr>
<tr>
<td>What student needs and issues were revealed?</td>
<td>Students need to apply themselves and do their homework.</td>
</tr>
<tr>
<td>Were there any areas where student performance was outstanding?</td>
<td>Many students understand hypothesis testing as it relates to the scientific method.</td>
</tr>
<tr>
<td>Any areas where it can be improved?</td>
<td>Students need to attend class and do all of their homework.</td>
</tr>
</tbody>
</table>
### Next Step in the Classroom to Improve Student Learning

**How might student performance be improved?**

Check all the items faculty/staff felt would help them address the needs and issues that were revealed by the assessment.

- Revise content of assignment/activities
- Revise activities leading up to and/or supporting assignments/activities
- Use methods of questioning that encourage the competency you measured
- Ask a colleague to critique assignments/activities

### Next Step in the Department to Improve Student Learning

Check all that the department felt would help them improve student learning.

- Offer/encourage attendance at seminars, workshops or discussion groups about teaching methods
- Encourage faculty to share activities that foster competency
- Visit classrooms to provide feedback (mentoring)
- Analyze course curriculum, so that the department can build a progression of skills through courses

### Priorities to Improve Student Learning

(List the top 3-6 things faculty/staff felt would most improve student learning)

- Increase class attendance.
- Improve study skills including note taking, reviewing lecture notes and previewing upcoming material.
- Increase engagement of students during class

### Implementation

- Ensure that students are developing study skills as they progress through the curriculum.
- Improve mentoring.

### Timeline for Implementation

On going.
## Transfer and Basic Skills
### Departmental Assessment Analysis Form

### PERSONAL RESPONSIBILITY COMPETENCY (CORE IV) ASSESSMENT

<table>
<thead>
<tr>
<th>Department</th>
<th>Math</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meeting Date</strong></td>
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<tr>
<td><strong>Number of Faculty/Staff participating in dialogue</strong></td>
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<td>FULLTIME</td>
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<tr>
<td>ADJUNCT</td>
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</tr>
<tr>
<td><strong>Number of Faculty/Staff sharing Assessment Results</strong></td>
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<td>FULLTIME</td>
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</tr>
<tr>
<td>ADJUNCT</td>
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</tr>
<tr>
<td><strong>Total number of faculty/staff in department</strong></td>
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<td>FULLTIME</td>
<td>19</td>
</tr>
<tr>
<td>ADJUNCT</td>
<td>25-30</td>
</tr>
<tr>
<td><strong>Core Competency or Course SLOs measured</strong></td>
<td>Personal Responsibility Core Competency(CORE IV)</td>
</tr>
<tr>
<td><strong>Assessment Tools</strong></td>
<td>Instructors used traditional homework, required visits to the MLC for tutoring, open note quizzes, and homework completion requirements before being allowed to take an exam as the assessment tools.</td>
</tr>
<tr>
<td><strong>Assessment Results</strong></td>
<td>Only 7 of 30 students (23%) made their required tutoring session; 13 of 67 of students (19%) did not complete the homework required to take their Math 254 exam.</td>
</tr>
<tr>
<td><strong>What student needs and issues were revealed?</strong></td>
<td>There is either a misunderstanding as to expectations or great student apathy.</td>
</tr>
<tr>
<td><strong>Were there any areas where student performance was outstanding?</strong></td>
<td>26 of 28 students (93%) had passing scores on their traditional homework; 30 of 40 students (75%) took all of the open note quizzes.</td>
</tr>
<tr>
<td><strong>Any areas where it can be improved?</strong></td>
<td>Student responsibility can be improved. Many students seem to have reasons for being enrolled other than to attend and pass the class.</td>
</tr>
<tr>
<td>Next Step in the Classroom to Improve Student Learning</td>
<td>How might student performance be improved?</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Check all the items faculty/staff felt would help them address the needs and issues that were revealed by the assessment.</td>
<td>State goals or objectives of assignment/activity more explicitly</td>
</tr>
<tr>
<td></td>
<td>Revise content of assignment/activities</td>
</tr>
<tr>
<td></td>
<td>Revise the amount of writing/oral/visual/clinical or similar work</td>
</tr>
<tr>
<td></td>
<td>Increase in-class points, such as for participation, to encourage attendance and student engagement</td>
</tr>
<tr>
<td></td>
<td>Hold students accountable for their responsibilities</td>
</tr>
<tr>
<td></td>
<td>Teach study skills and how to be a successful student</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Next Step in the Department to Improve Student Learning</th>
<th>Check all that the department felt would help them improve student learning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Encourage faculty to share activities that foster competency</td>
</tr>
</tbody>
</table>

| Priorities to Improve Student Learning | Assign a mandatory visit to the MLC for tutoring help. Include an ‘error analysis’ form which describes the problem on which they received help, what they learned and a personal reflection on the visit. |
| | Teach how to be a successful student including improving study skills, meeting deadlines, and actively participating in class. |
| | Have students fill out information sheets at the beginning of the semester stating their goals and refer to them throughout the semester. |
| | Help classes set up study groups. |

| Implementation | Much of this assessment focused on basic skills, and the department is currently working with ACES, DBA, and STARS to improve the overall study skills and personal responsibility of our basic skills students. |
| | The department discusses student success at our monthly meetings and during Flex Week, and individual instructors regularly discuss student success. |

| Timeline for Implementation | On going. |
Appendix C
Curriculum and Model Program

A. Curriculum:
List of program courses and curriculum changes submitted.
- Math 2 – new course offered Fall 2009
- Math 3 – new course offered Fall 2009
- Math 4 – updated SLOs and student units
- Math 5A – updated SLOs and student units
- Math 5B – updated SLOs and student units
- Math 5C – updated SLOs and student units
- Math 6 – updated SLOs
- Math 7 – updated SLOs
- Math 10 – updated SLOs and content
- Math 12 – updated SLOs and student units
- Math 12H – new course to be offered Fall 2010 or Spring 2011
- Math 13 – updated SLOs
- Math 15 – updated SLOs
- Math 18 – updated SLOs
- Math 23 – updated SLOs
- Math 152 – updated SLOs and student units
- Math 152A – new course offered Fall 2008
- Math 152B – new course offered Spring 2009
- Math 153 – updated SLOs
- Math 154 – updated SLOs and student units
- Math 154A – updated SLOs and student units
- Math 154B – updated SLOs and student units
- Math 158BF – updated SLOs
- Math 158GC – updated SLOs
- Math 158PF – updated SLOs
- Math 158SI – updated SLOs
Math 158T – updated SLOs
Math 254A – updated SLOs and student units
Math 254B – updated SLOs and student units
Math 254CM - updated SLOs and student units, renamed
Math 502 – description, repeatability, objectives

Courses in development for Fall 2010:
Math 254SI – accelerated lecture format with supplemental instruction (Title V grant)
Math 190A–Z – special topics courses to support the DBA

B. Model Program:

The following model program fulfills requirements for the A.S./A.A. Degree in Mathematics at Cabrillo College. Specific lower division major preparation at four-year public institutions in California can be found at www.assist.org. Please see a counselor for advisement for transfer to any four-year institution.

<table>
<thead>
<tr>
<th>Core Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 5ABC Analytic Geometry and Calculus I, II, III</td>
<td>15</td>
</tr>
<tr>
<td>MATH 6 Introduction to Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 7 Introduction to Differential Equations</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electives</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 12/12H Elementary Statistics</td>
<td>5</td>
</tr>
<tr>
<td>MATH 23 Discrete Mathematics</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: No other math class counts toward an associate degree in mathematics.

<table>
<thead>
<tr>
<th>Recommended from Related Disciplines</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural, Physical, Computer Science and/or Engineering</td>
<td>3 – 12</td>
</tr>
<tr>
<td>PHYS 4ABC Physics for Scientists &amp; Engineers</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Associated in Arts Degree in Mathematics</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>30</td>
</tr>
<tr>
<td>Mathematics Core Courses</td>
<td>18</td>
</tr>
<tr>
<td>Physics 4ABC Physics for Scientists and Engineers</td>
<td>15</td>
</tr>
<tr>
<td>Total for A.A. Degree in Mathematics</td>
<td>63</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Associated in Science Degree in Mathematics</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>21</td>
</tr>
<tr>
<td>Mathematics Core Courses</td>
<td>18</td>
</tr>
<tr>
<td>Physics 4ABC Physics for Scientists and Engineers</td>
<td>15</td>
</tr>
<tr>
<td>Mathematics, Natural, Physical, Computer Science and/or Engineering Electives</td>
<td>6</td>
</tr>
<tr>
<td>Total for A.S. Degree in Mathematics</td>
<td>60</td>
</tr>
</tbody>
</table>
Appendix D
College Catalog Pages

The pages from the online catalog can be found here:
MATH 4
Pre-Calculus Algebra and Trigonometry
5 units; 5 hours Lecture
Prerequisite: MATH 152 or equivalent skills.
Recommended Preparation: MATH 153 or high school geometry or equivalent skills; Eligibility for ENGL 100 and READ 100.

A study of functions and their properties including trigonometric, logarithmic, exponential, polynomial, rational functions and their graphs, inverses and applications. The relationship between the equation form of a function and its graph will be emphasized. May not be taken pass/no pass.
Transfer Credit: Transfers to CSU, UC.

MATH 5A
Analytic Geometry and Calculus I
4 units; 5 hours Lecture
Prerequisite: MATH 2 and MATH 3 or MATH 4 or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Designed for majors in mathematics, engineering and physical sciences. Plane analytic geometry of lines and graphs, differential calculus of algebraic and transcendental functions of one variable with applications. May not be taken pass/no pass.
Transfer Credit: Transfers to CSU, UC, with limits: MATH 5A & 18 combined-maximum credit-1 course.

MATH 5B
Analytic Geometry and Calculus II
4 units; 5 hours Lecture
Prerequisite: MATH 5A or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Designed for majors in mathematics, engineering, and physical sciences. Integral calculus of algebraic and transcendental functions of one variable with applications, techniques of integration, sequences and series. May not be taken pass/no pass.
Transfer Credit: Transfers to CSU, UC.

MATH 5C
Analytic Geometry and Calculus III
4 units; 5 hours Lecture
Prerequisite: MATH 5B or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Designed for majors in mathematics, engineering, and physical sciences. Vectors and vector functions, multivariable calculus of algebraic and transcendental functions, line and surface integrals, vector field theory. May not be taken pass/no pass.
Transfer Credit: Transfers to CSU, UC.

MATH 6
Introduction to Linear Algebra
3 units; 3 hours Lecture
Prerequisite: MATH 5C or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Introduces linear algebra, including vectors in n-dimensional R space, row reductions, inverse matrices, determinants, vector spaces, basis, change of basis, linear independence, transformations, eigenvalues, eigenvectors, Gram-Schmidt process. Offered spring only. May not be taken pass/no pass.
Transfer Credit: Transfers to CSU, UC.

MATH 7
Introduction to Differential Equations
3 units; 3 hours Lecture
Prerequisite: MATH 5C or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.

An introductory course in Differential Equations: first order, second order, homogeneous, nonhomogeneous, variation of constants, applications. Simple linear systems with constant coefficients, Laplace transforms, Euler’s method. May not be taken pass/no pass.
Transfer Credit: Transfers to CSU, UC.

MATH 10
Survey of College Mathematics
3 units; 3 hours Lecture
Prerequisite: MATH 153 or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.

A survey course in mathematics that uses intermediate algebra skills to examine the concepts and applications of various topics. Core topics are: set theory, logic, mathematical modeling, probability and statistics. Additional topics may include: mathematical systems, the mathematics of finance, ideas from geometry, or an introduction to calculus concepts.
Transfer Credit: Transfers to CSU, UC.

MATH 12
Elementary Statistics
4 units; 5 hours Lecture
Prerequisite: MATH 152 or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Presents histograms, measures of central tendency and dispersion, probability, binomial and normal distributions, estimation and hypothesis testing, regression and correlation. Recommended for social science majors, environmental studies majors, and some liberal arts majors. Requires extensive use of a graphing calculator or desktop computer to complete several required lab assignments. May be offered in a Distance-Learning Format.
Transfer Credit: Transfers to CSU, UC with limits: MATH 12 combined with BUS 9-maximum credit-1 course.
MATH 12H
Honors Elementary Statistics
4 units; 5 hours Lecture
Prerequisite: MATH 13 or equivalent skills; Honors standing.
Recommended Preparation: ENGL 1A/1AH/1AMC/1AMCH.
Practically reviews, measures of central tendency and dispersion, probability, binomial and normal distributions, estimation and hypothesis testing, regression and correlation. Recommended for social science majors, environmental studies majors, and some liberal arts majors. Requires extensive use of a graphing calculator or desktop computer to complete several required lab assignments.
Transfer Credit: Transfers to CSU, UC pending review.

MATH 13
Finite Mathematics
3 units; 3 hours Lecture
Prerequisite: MATH 13 or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
Set theory, linear programming, matrices, mathematics of finance, probability, with applications to business and the social sciences.
Transfer Credit: Transfers to CSU, UC.

MATH 15
Number Systems
3 units; 3 hours Lecture, 1 hour Laboratory
Prerequisite: MATH 13; MATH 15B or equivalent.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
Provides an understanding of the nature of arithmetic and the structure of mathematical systems as used by liberal arts students and prospective elementary teachers. Topics covered may include a study of sets, relations, systems of numeration, and the real number system. Offered spring only.
Transfer Credit: Transfers to CSU, UC. Does not meet UC math admission requirements.

MATH 18
Business Calculus
3 units; 3 hours Lecture
Prerequisite: MATH 13 or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
Provides an intuitive introduction to differential and integral calculus for functions of one variable and an introduction to functions of several variables including partial differentiation and maxima/minima problems.
Transfer Credit: Transfers to CSU, UC, with limits: MATH 5A & 18 combined=maximum credit-1 course.

MATH 23
Discrete Mathematics
4 units; 3 hours Lecture, 3 hours Laboratory
Prerequisite: MATH 5A or equivalent.
Recommended Preparation: CS 19, CS 20I, or equivalent; Eligibility for ENGL 100 and READ 100.
Practically reviews mathematical systems including methods of proof that shape the foundations of computer science. Includes set and number theory, Boolean Algebra, deductive and inductive proof, logic, equivalence, order, and recurrence relations, combinatorics, graph and network models, circuits and circuit minimization techniques, automata, and grammars. Computer science majors should enroll in CS 23 (identical to MATH 23). Offered spring only.
Transfer Credit: Transfers to CSU, UC.

MATH 152
Intermediate Algebra
4 units; 5 hours Lecture
Prerequisite: MATH 151 or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
Further development of algebraic skills acquired in elementary algebra, which includes the system of real numbers, polynomials, algebraic equations (linear, systems of linear, quadratic, and applications). The characteristics and properties of linear and quadratic functions are studied in detail, with an introduction to negative exponents, systems of linear equations in three variables, complex rational equations, complex numbers, inverse, exponential and logarithmic functions, conic sections, and non-linear systems. Problem-solving skills are developed to encourage students to use their basic knowledge of algebra to explore problems. May be offered in a Distance-Learning Format. May not be taken pass/no pass.

MATH 152A
Intermediate Algebra—First Half
2 units; 3 hours Lecture, 1 hour Laboratory
Prerequisite: MATH 151 or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
Presents the first half of Intermediate Algebra and is designed for a wide variety of students, including those who have been unsuccessful in MATH 152, are math anxious, or desire a slower paced, year-long version of MATH 152. When followed by MATH 152B, satisfies Cabrillo’s math graduation requirement for Associate of Arts and Associate of Science Degree. Covers linear equations, functions and graphs, systems of linear equations and inequalities, compound inequalities, factoring, polynomial equations, rational expressions and rational equations. Offered fall only. May not be taken pass/no pass.

MATH 152B
Intermediate Algebra—Second Half
2 units; 3 hours Lecture, 1 hour Laboratory
Prerequisite: MATH 152A.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
Presents the second half of Intermediate Algebra and, when taken after MATH 152A, satisfies Cabrillo’s math graduation requirement for Associate of Arts and Associate of Science Degree. Covers radical, exponential, and logarithmic expressions and equations, composition and inverse of functions, graphs, and applications. Offered spring only. May not be taken pass/no pass.
MATH 153
Plane Geometry
3 units; 3 hours Lecture
Prerequisite: MATH 154 or equivalent skills.
Recommended Preparation: Eligibility for ENGR 100 and READ 100.
Introduces the vocabulary and principles of Euclidean geometry, developing critical thinking skills using inductive and deductive reasoning while exploring the concepts of congruence and similarity, the properties of angles, lines, polygons, circles, and solids. May be offered in a Distance-Learning Format.

MATH 154
Elementary Algebra
4 units; 5 hours Lecture
Prerequisite: MATH 254 or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
Presents a systematic development of numbers, polynomials and polynomial fractions, applications to the solution of linear equations, graphing of and solutions for systems of linear equations, quadratic equations and an introduction to exponents and radicals. Contains topics typical of first-year high school algebra, but taught at a college level. May not be taken pass/no pass. May be offered in a Distance-Learning Format.

MATH 154A
Elementary Algebra—First Half
2 units; 5 hours Lecture, 4 hours Laboratory
Prerequisite: MATH 254 or equivalent skills.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
Designed for a wide variety of students, including those who have been unsuccessful in MATH 154. For math anxious, have learning disabilities in mathematics, or desire a slower pace, year-long version of MATH 154. Course is supplemented with individual tutoring within the class structure to provide extra individual assistance and has an excellent track record of student success. This course is the first half of Elementary Algebra. The content covered contains a systematic development of numbers, solving first degree equations and inequalities, graphing two variable linear equations, and two variable systems of equations. Offered fall only. May not be taken pass/no pass.

MATH 154B
Elementary Algebra—Second Half
2 units; 5 hours Lecture, 4 hours Laboratory
Prerequisite: MATH 154A.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
The second half of Elementary Algebra and intended only for students who have successfully completed MATH 154A. Provides a systematic development of polynomial fractions, applications to the solution of quadratic equations, and an introduction to exponents and radicals. Offered spring only. May not be taken pass/no pass.

MATH 155BF
Algebra Review—Basic Factoring
0.5 unit; 1.5 hours Laboratory
Corequisite: MATH 154 or higher level math course.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
This independent instruction module covers prerequisite skills for factoring followed by extensive drill on the five factoring techniques typically included in an elementary algebra course. This course may be taken pass/no pass only.

MATH 155GC
Introduction to the Graphing Calculator
0.5 unit; 0.5 hour Lecture
Recommended Preparation: MATH 152; Eligibility for ENGL 100 and READ 100.
An introduction to the use of handheld graphing calculators in mathematics courses. Emphasis will be placed on the Texas Instruments TI-83 (and TI-83 Plus), TI-85, TI-86, and TI-89. Strongly recommended for students enrolled in a mathematics course where the use of a graphing calculator is required. May be taken for pass/no pass only.

MATH 155PF
Algebra Review—Polynomial Fractions
0.5 unit; 1.5 hours Laboratory
Corequisite: MATH 154 or higher level math course.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
This independent instruction module covers addition and subtraction of polynomial fractions at the level of elementary algebra. A brief review of the least common multiple of two or more polynomials is included, and the ability to express an answer in lowest terms is emphasized. May be taken for pass/no pass only.

MATH 155SI
Using the Metric System
0.5 unit; 1.5 hours Laboratory
Corequisite: MATH 154 or higher level math course.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
This independent instruction module introduces the units and uses of the metric system and its applications. May be taken for pass/no pass only.

MATH 155T
Preparation for Tutoring Mathematics
1 unit; 3 hours Laboratory
Repeatable: May be taken 2 times.
Recommended Preparation: MATH 4 with a minimum grade of B or better in recently completed MATH classes; Eligibility for ENGL 100 and READ 100.
Provides tutoring techniques and hands-on training for math tutors and those interested in tutoring mathematics. Strategies for maximizing active learning are emphasized. Specifically designed for students enrolled in or recently completing MATH 12, 12H, 13, 15, 5A, 5B, or 5C.
MATH 195A-Z
Survey Topics in the Scientific Method
2 units; 2 hours Lecture, 1 hour Laboratory
Repeatability: May be taken 4 times.
Recommended Preparation: Eligibility for ENGL 100 and READ 100.
Introduces the prospective math or science major some of the tools and skills that assist scientists in their work. Covers the general framework and philosophy of the scientific method, which forms the basis of the adoption and rejection of any theory in science.

MATH 254
Essential Mathematics
3 units; 6 hours Laboratory
Presents topics using computer software, assisted by the instructor, and covers arithmetic procedures involving whole numbers, fractions, decimals, percent, integrated with signed numbers, equations, statistics, proportions, graphing, and geometry. May be offered in a Distance-Learning Format.

MATH 254A
Essential Mathematics—First Half
2 units; 3 hours Lecture, 2 hours Laboratory
Covers arithmetic procedures involving whole numbers, fractions, and decimals integrated with equations and proportions.

MATH 254B
Essential Mathematics—Second Half
2 units; 3 hours Lecture, 2 hours Labortory
Prerequisite: MATH 254A.
Continuation of arithmetic studies of MATH 254A with decimals and percent integrated with signed numbers, equations, proportion, statistics and graphing. This course is the second half of MATH 254.

MATH 502
Supervised Tutoring
0 units; 5 hours Laboratory
Repeatability: May be repeated.
Supervised individual and group drop-in tutoring assistance in basic skills, high school equivalent, and transfer mathematics courses, including mathematics applications found in science courses. Repeatable with each enrollment in a Cabrillo mathematics course.
<table>
<thead>
<tr>
<th>High School</th>
<th>Existing Course Placement</th>
<th>Language</th>
<th>Advanced Math</th>
<th>All students must assess at Cabrillo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palos Verdes</td>
<td>Pre-Calculus or IMPS with C or better - placed into Math 5A</td>
<td></td>
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<tr>
<td>AVCI</td>
<td>Placement into MATH 25A to Transfer Level Math</td>
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</tr>
<tr>
<td>Cypress Charter</td>
<td>Pre-Calculus with C or better - placed into Math 5A</td>
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<tr>
<td>Harbor High</td>
<td>Accelerated Algebra II (Pre-Calculus &quot;B&quot; or better)</td>
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<tr>
<td></td>
<td>OR Math Analysis &quot;B&quot; or better</td>
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<tr>
<td></td>
<td>OR Intro Calc Honors (&quot;C&quot; or better) - placed into Math 5A</td>
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<tr>
<td>Mercy</td>
<td>Placement into MATH 25A to Transfer Level Math</td>
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<tr>
<td>Pacific Colacita (PGC)</td>
<td>Pre-Calculus with Trigonometry (&quot;C&quot; or better) - placed into</td>
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<td>Math 5A</td>
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<tr>
<td>SLV</td>
<td>Math Analysis or UP 4, &quot;C&quot; or better - placed into Math 5A</td>
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<tr>
<td>Santa Cruz High</td>
<td>Algebra II and Analytical Geometry/Trigonometry and Pre-Calculus &quot;C&quot; or better - placed into Math 5A</td>
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<tr>
<td>Santa Clara Valley</td>
<td>11 Math SL or HL, (Pre-Calculus) OR AP Calculus AB or</td>
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<td></td>
<td>11 Math HI, 2 Calculus I, Honors Pre-Calculus &quot;C&quot; or</td>
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<td></td>
<td>student - placed into Math 5A</td>
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<td></td>
<td>Students wishing to begin higher than Math 5A must have</td>
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<td></td>
<td>taken the KSSE exam before 12th grade with a score of 3 or higher</td>
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<tr>
<td>Sequoia</td>
<td>Pre-Calculus/Analytical Geometry AB with &quot;B&quot; or better OR</td>
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<tr>
<td></td>
<td>Pre-Calculus/Analytical Geometry Honors with &quot;C&quot; or better</td>
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<td>placed into Math 5A</td>
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<tr>
<td>Watsonville</td>
<td>Pre-Calculus or HL(Honors) Pre-Calculus with a &quot;C&quot; or better</td>
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<tr>
<td></td>
<td>placed into Math 5A</td>
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</tbody>
</table>
ARTICULATION AGREEMENT
ACADEMIC/VOCATIONAL CHARTER INSTITUTE (AVCI)
--CABRILLO COLLEGE

This is an agreement between AVCI and Cabrillo College intended to assist in the initial placement of AVCI students entering the Mathematics curriculum at Cabrillo College.

<table>
<thead>
<tr>
<th>AVCI</th>
<th>2007 - 2009</th>
<th>CABRILLO COLLEGE</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

High School Math including Algebra  →  Cabrillo College Assessment

Math 151  ↓  Math 152  ↓  Math 155

Total or Level Math

All entering students must take the assessment test at Cabrillo College. This test can place students in a course ranging from Beginning Algebra (Math 254) up to, and including, Pre-calculus (Math 5).

Course completion and placement to be verified by transcript.
Special conditions: This agreement is in place for 2 years.

Authorized Signatures:

[Signatures and dates for each party involved in the agreement.]

[Date]

[Date]

[Date]

1/29/07

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ARTICULATION AGREEMENT
APTOS HIGH SCHOOL - CABRILLO COLLEGE

This is an agreement between Aptos High School and Cabrillo College intending to assist in the initial placement of Aptos High School students entering the Mathematics curriculum at Cabrillo College.

1. All incoming students must take the assessment test at Cabrillo College. This test can place students in Cabrillo College courses ranging from Essential Mathematics (Math 254) up to and including Precalculus (Math 4).

2. Students seeking an initial placement in five-semester Calculus (Math 6A) must obtain an assessment test placement in an "Transfer level Math" and must have completed either Precalculus or IMP4 with a grade of C.

Course correlation and grades to be verified by transcript.

Special conditions/comments: This agreement is in place for 2 years.

Authorizing Signatures:

Aptos High School

Mary Bella Sullivan, Administration Officer

Cabrillo College

Signatures and Dates:

J. Conn 11/6/09

Wanda Turner 11/6/07

Mary Bella Sullivan 11/14/07

Diane Burbank, Principal

T. L. F. 11/7/07

Vice President Instruction

Cabrillo College

Signatures:

Math Faculty Aptos High School

Math Faculty Cabrillo College

Date

Date

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ARTICULATION AGREEMENT
CYPRESS CHARTER HIGH SCHOOL-CABRILLO COLLEGE

This is an agreement between Cypress Charter High School and Cabrillo College intended to assist in the initial placement of Cypress Charter High School students entering the Mathematics curriculum at Cabrillo College.

CYPRESS CHARTER HIGH SCHOOL  2007-2008  CABRILLO COLLEGE

1. Students must take the assessment test at Cabrillo College. This test can place students in Cabrillo College courses ranging from Essential Mathematics (Math 255) up to and including Pre-Calculus (Math 55).

2. Students seeking an initial placement in first-semester Calculus (Math 5A) must obtain an assessment test placement into "Transfer Level Math" and must have completed either Pre-calculus with a grade of C.

Course completion and grade to be verified by transcript.

Special conditions apply. This agreement is in place for 2 years.

Authorized Signatures:

[Signatures and dates]

Math Faculty, Cypress Charter High School

Math Faculty, Cypress Charter High School

Principal, Cypress Charter High School

Principal, Cypress Charter High School

Vice President Instruction, Cabrillo College

Vice President Instruction, Cabrillo College
ARTICULATION AGREEMENT
HARBOR HIGH SCHOOL-CABRILLO COLLEGE

This is an agreement between Harbor High School and Cabrillo College, intended to assist in the initial placement of Harbor High School students entering the Mathematics curriculum at Cabrillo College.

1. All entering students must take the assessment test at Cabrillo College. This test can place them in Cabrillo College courses ranging from Essential Mathematics (Math 254) up to and including Pre-calculus (Math 152).

2. Students seeking initial placement in first-semester Calculus (Math 3A) must either pass an assessment test score for "Transfer Level Math" and must have completed either: Accelerated Algebra II (2 years) or better, Math Analysis with a B or better, or Intro to Calculus Honors with a C or better.

Course completion and grade to be verified by transcript. This agreement is in place for 3 years.

Authorized Signatures:

Nguyễn Phan, Principal
Harbor High School

Wanda Gentry, Division Dean
Cabrillo College

Mary Ellen Sullivan, Dean Counseling
Cabrillo College

Ramona Shires, Vice President, Instruction
Cabrillo College
# Cabrillo College

## Articulation Agreement

### Pacific Collegiate School - Cabrillo College

This is an agreement between Pacific Collegiate School and Cabrillo College intended to assist in the initial placement of students entering the Mathematics curriculum at Cabrillo College.

<table>
<thead>
<tr>
<th>Pacific Collegiate School</th>
<th>2008-2010</th>
<th>Cabrillo College</th>
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</table>

1. **High School Math**
   - Calculus or
   - **Math 254**
   - **Math 114**
   - **Math 112**
   - **Intermediate Algebra**

2. **Pre-Calculus with Trigonometry with a "C" or better**

   - **Cabrillo College Assessment**
   - Placement into Transfer Level Math
   - **Math 5A**
   - **Calculus**

---

1. All entering students must have taken the math assessment test at Cabrillo College. This test places students in Cabrillo College courses ranging from essential mathematics (Math 254) up to and including Pre-calculus (Math 114).

2. Students seeking an initial placement in one-semester Calculus (Math 5A) must achieve an assessment test placement into "Transfer Level Math" and must have completed Pre-Calculus with Trigonometry with a grade of "C" or better.

---

**Course Completion and Grade to be verified by:** [Signatures and dates]

**10/19/05**

**Date**

**10/05/05**

**Date**

**10/16/05**

**Date**

**Date**

**Date**

---

**Authorized Signatures:**

**Nancy L. Bartus**

Chair, Pacific College of the Rockies

**Michele A. O'Hara**

Dean of Math and Science, Pacific Collegiate School

**Debra S. Seiler**

Chair, Mathematics, Pacific Collegiate School

**M.D. Sullivan**

Chair, Math and Science, Pacific Collegiate School

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**Number of Pages:** 508
ARTICULATION AGREEMENT
SAN LORENZO VALLEY HIGH SCHOOL - CABRILLO COLLEGE

This is an agreement between San Lorenzo Valley High School and Cabrillo College intended to assist in the initial placement of San Lorenzo Valley High School students entering the Mathematical curriculum at Cabrillo College.

SAN LORENZO VALLEY HIGH SCHOOL 2007 - 2008  CABRILLO COLLEGE

1. High School, Math including Algebra

   Math 214  Math 15A  Math 12

   Cabrillo College Assessment

   Transfer Level Math

   Math 34

2. Math Analysis or IMP 4 (C or better)

   Cabrillo College Assessment placement into Transfer Level Math

   Math 34 (Calculus)

Course completion and grade to be verified by transcript. Final conditions/commitments: This agreement is in place for 2 years.

Authorized Signatures:

Joan Casy  12/4/07  Mary Weller  11/6/07
Co-Chairing Math Chair
Cabrillo College  Cabrillo College

Wanda Garner  11/6/07  Michael Andrus  11-5-07
Dean of Academics  Principal
SLV High School  SLV High School

Mary Ellen Sullivan  11-1-07  Reeree Moore  11-8-07
Admissions Officer  Vice President for Instruction
Cabrillo College  Cabrillo College

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ARTICULATION AGREEMENT
SANTA CRUZ HIGH SCHOOL - CABRILLO COLLEGE

This is an Agreement between Santa Cruz High School and Cabrillo College intended to assist in the initial placement of students entering the Mathematics curriculum at Cabrillo College.

SANTA CRUZ HIGH SCHOOL  2007-2008  CABRILLO COLLEGE

1. High School Math  
   Including Algebra  
   
   Math 251  Math 154  Math 12  Transfer  
   Level Math
   
   Cabrillo College  
   Assessment  
   
   Algebra II and  
   Analytic Geometry;  
   Trigonometry and  
   Intro. to Calculus  
   with a "C" or better  
   
   Cabrillo College  
   Assessment  
   placement into Transfer  
   Level Math  
   
   Math 5A  
   (Calculus)
   
   1. All entering students must take the Accuplacer test at Cabrillo College. This test places students in Cabrillo College courses ranging from Pre-algebra to Calculus (Math 251) up to and including Pre-calculus (Math 4).

   2. Students seeking an initial placement in Pre-calculus Calculus (Math 5A) must obtain an average grade of C or better in "Transfer Level Math" and must have completed Analytic Geometry/Trigonometry and Intro. to Calculus with a grade of "C" or better.

   Course completion and grade to be verified by transcript.

   Special conditions/requirements: This agreement is in place for 2 years.

   Authorize Signatures:

   Nancy Fettman  
   Dean, Chair  
   Cabrillo College  
   
   Wanda Barnes  
   Div. Dean  
   Cabrillo College  
   
   Mary Ellen Sullivan  
   Admissions Officer  
   Cabrillo College  
   
   Renee Klein  
   Vice-President Instruction  
   Cabrillo College

   Date  
   Date  
   Date  
   Date  

   3-8-08  
   3-8-08  
   9/6/08  
   9/6/08

   Math Facility  
   Santa Cruz High School  
   Math Facility  
   Santa Cruz High School

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ARTICULATION AGREEMENT
SCOTTS VALLEY HIGH SCHOOL- CABRILLO COLLEGE

This is an Agreement between Scotts Valley High School and Cabrillo College, intended to assist in the initial placement of Scotts Valley High School students entering the Mathematics curriculum at Cabrillo College.

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<thead>
<tr>
<th>SCOTTS VALLEY HIGH SCHOOL</th>
<th>2008-2010</th>
<th>CABRILLO COLLEGE</th>
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<td>Cabrillo College</td>
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<td>Math 254</td>
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<td>Assessment</td>
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<td>Math 134</td>
<td>Math 52</td>
<td>Transfer Level Math</td>
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<tr>
<td>Language</td>
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<tr>
<td>Math 5A</td>
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</tr>
</tbody>
</table>

1. All incoming students must pass the placement test at Cabrillo College. This test can place students in Cabrillo College courses ranging from Pre-Calculus (Math 254) upward including Pre-Calculus (Math 134).

2. Students entering as initial placement in Calculus 1 (Math 5A) must achieve an assessment score for "Transfer Level Math" and must have completed Pre-Calculus or IB Math SL/HL (1 or 2) or Honors Pre-Calculus with a "C" or better. Students wishing to begin higher (Calculus I must have taken Pre-Calculus and earned an average of 90 or higher, and be evaluated.)

Course completion and grade to be verified by transcript. This agreement is in place for 2 years.

Authorized Signatures:

Mary L. Pettrey 9/23/08
Nancy Poteman, Dept. Chair
Cabrillo College

Wanda Gill 9/16/08
Wanda Gill, Division Chair
Cabrillo College

Marc Elder 9/18/08
Marc Elder, Chair
Cabrillo College

Kathy Reigh 9/23/08
Kathy Reigh, Math Instructor
Scotts Valley High School

Sherry Powell 9/23/08
Sherry Powell, Principal
Scotts Valley High School

Vice President, Instruction
Cabrillo College
**ARTICULATION AGREEMENT**

**SOQUEL HIGH SCHOOL - CABRILLO COLLEGE**

This is an Agreement between Soquel High School and Cabrillo College, intended to assist in the initial placement of students entering the Mathematics curriculum at Cabrillo College.

<table>
<thead>
<tr>
<th>SOQUEL HIGH SCHOOL</th>
<th>2007-2008</th>
<th>CABRILLO COLLEGE</th>
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</table>

1. High School Math including Algebra
   - Math 254
2. Pre-Calculus/Analytical Geometry
   - Math 254
   - Math 12
   - Math 54

1. Cabrillo College Assessment
2. Cabrillo College Assessment placement into Transfer Level Math
3. Math 54 (Calculus)

**1. All students must take the assessment test at Cabrillo College. This test can place students in Cabrillo College courses ranging from Elementary Mathematics (Math 254) up to and including Pre-Calculus (Math 54).**

**2. Students seeking an initial placement in first-semester Calculus (Math 54) must obtain an assessment test placement into "Transfer Level Math" and must have completed Pre-Calculus/Analytical Geometry with a "B" or better or Pre-Calculus/Analytical Geometry Honors with a "C" or better.**

Course completion and grades to be verified by transcript. Special conditions: This agreement is in place for 2 years.

**Authorized Signatures:**

- Judy Cane, Vice President, Instruction, Cabrillo College
  - Date: 1/1/09

- June Buining, Director, Soquel High School
  - Date: 1/1/09

- Mary Ellen Sullivan, Math Department Chair, Cabrillo College
  - Date: 1/1/09

- Larry M. Anderson, Vice President, Soquel High School
  - Date: 1/1/09

- Jack Wren, Math Faculty, Soquel High School
  - Date: 1/1/09

- Mary Ellen Sullivan, Math Department Chair, Cabrillo College
  - Date: 1/1/09

- Jack Wren, Math Faculty, Soquel High School
  - Date: 1/1/09

- Larry M. Anderson, Vice President, Soquel High School
  - Date: 1/1/09
ARTICULATION AGREEMENT
WATSONVILLE HIGH SCHOOL - CABRILLO COLLEGE

This is an Agreement between Watsonville High School and Cabrillo College intended to assist in the initial placement of students entering the Mathematics curriculum at Cabrillo College.

WATSONVILLE HIGH SCHOOL 2007 - 2009  

1. High School Math  
   - Including Algebra (Math 154)  
   - Pre-calculus (Math 152)  

   Cabrillo College Assessment  

   Math 254  
   Math 154  
   Math 152  
   Math 5A  
   Math 5B  
   Math 5C  
   Math 5D  

2. Pre-calculus or  
   (Transfer) Pre-calculus with a  
   "C" or better.

   Cabrillo College Assessment  
   Placement into Transfer  
   Level Math

Math 5A  
(Calculus)

Course completion and grades to be verified by transcript.

Special conditions/requirements: This agreement is in place for 2 years.

"Students needing in Algebra I at time of assessment" take the "Algebra Readiness" test, students who have completed Algebra II or higher at time of assessment take the "Pre-Calculus" test.

Authorized Signatures:

Nancy Feldman, Dept. Chair  
Cabrillo College

Date

Math Faculty  
Watsonville High School

Date

Vice Principal, WSC  
Cabrillo College

Date

Vice Principal, Principal  
Watsonville High School

 Date

Cabrillo College

Date

WSC