See program review website for detailed timeline and relevant request forms:
https://research.gwc.cccd.edu/oir/progreview/2013/index.html

Golden West College
INSTRUCTIONAL
PROGRAM REVIEW
Spring 2013

Program Name: Mathematics
Division Name: Business/Social Science/Natural Science/Mathematics

Overview of Program: *(THIS DESCRIPTION WILL LIKELY BE USED ON YOUR DEPARTMENT'S WEBSITE.)*
The Mathematics Department integrates the use of technology and online resources to offer basic skills courses in Elementary and Intermediate Algebra and transfer courses for students in business, social sciences, education, mathematics, and physical sciences.

During this program review cycle, the department had one faculty and one classified staff retirements. However, the department was able to hire two full-time tenure-track faculty in 2012 and replaced the classified staff with a 160-day hourly staff. As a result, the department currently has 7 full-time faculty (2 on tenure-track), one hourly staff in the math lab, and 15 part-time faculty.

In summer 2011, the Mathematics Department partnered with the English and Counseling Departments to offer a pilot Summer Bridge Program. The 3-week program consisted of first-time GWC freshmen students who had marginal scores on their English and math placement tests. Students who qualified—after two weeks of mathematics remediation with the assistance of an instructor—were given the opportunity to retest for a higher math placement level. The program was discontinued due to lack of administrative support and funding. In fall 2011, the department stopped offering online sections in Elementary Algebra and Intermediate Algebra due to the low success, retention, and completion rates. In addition, beginning in fall 2012, the budgetary shortfalls and necessary cuts imposed on the department were an impetus for the department to reconsider the appropriateness of offering courses in Basic Mathematics and Pre-Algebra at the college level. After much discussion and careful consideration, the department determined the best course of action was to stop offering courses in Basic Mathematics and Pre-Algebra and establish Elementary Algebra as our academic floor for college level mathematics. As a result, our Basic Skills Program is now a 1-year (2-semester) program consisting of only traditional (on-campus) courses in Elementary Algebra and Intermediate Algebra. The prerequisite for Elementary Algebra was removed and students being placed into Basic Mathematics and/or Pre-Algebra will be advised to remediate their math skills before enrolling in Elementary Algebra.

The Math Lab continues to be an important component of our Basic Skills Program and courses. The Math Lab provides students with computer access to develop their mathematics skills using online resources as well as Math Lab staff that provide tutoring for remedial-level math students. Each year, the department has been granted additional funds from the Associated Student Body to hire student assistants to work in the lab.

In addition to the GWC Associate of Arts degree in Mathematics, the department has an approved transfer model curriculum leading to an Associate of Science for Transfer degree in Mathematics and an Associate of Arts degree in Liberal Arts with an emphasis in Mathematics. From 2010 to 2012, there were 18 students receiving one of the identified degrees. The department continues to review, assess, and discuss Student Learning Outcomes (SLOs) for all mathematics courses and programs. The department is well represented on several college-wide committees by its entire full-time faculty and relevant issues are regularly discussed at each department meeting.

The department annually awards several departmental scholarships to students planning to continue their education in a STEM field. In addition, we continue to participate in the annual mathematics competition through the American Mathematical Association of Two Year Colleges (AMATYC) and the top three students are given an award and advance to the next level of the competition. The highest scoring GWC student is recognized with their name placed on the winner's plaque outside the Math Lab.

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Current State of the Program

1. What noteworthy trends do you notice in your data tables?

Enrollments and Full-Time Equivalent Students (FTES):
From fall 2008 to spring 2012, the number of students enrolled in mathematics (at census) has been consistent with an average of 4,543 students per semester. Over this period, the department had a 6.8% reduction in the number of sections that were offered while only realizing a reduction of 3.9% in FTES. Additionally, the ratio of FTES to Full-Time Equivalent Faculty (FTEF) increased from 54.5 in fall 2008 to 57.1 in fall 2011. The average FTES/FTEF ratio over this time period was 55.6 students per faculty.

Student Success and Retention:
Over the last 4 years, overall student success rates for all mathematics courses have increased by 6.1%.

Student Success Rates

	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012
Success Rate	47.5%	48.1%	48.5%	49.3%	49.8%	49.5%	52.6%	53.6%
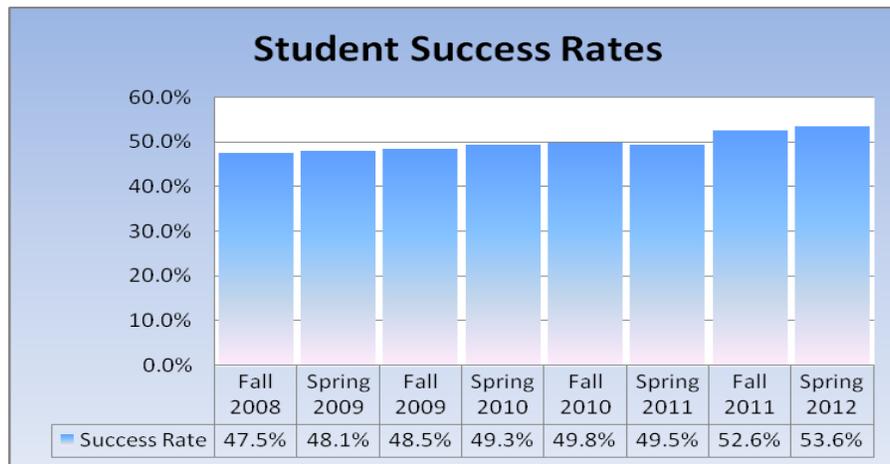
However, throughout this period, the overall student success rates for all large class factor mathematics courses (55 and above) have consistently been less than the success rates for all mathematics classes having fewer than 55 students (typically set at 36 students) in each class.

Overall Success Rates by Class Size

	(1.0) <55	(1.5) 55-119	(2.0) 120-239
Fall 2008-2012	56.2%	52.3%	41.8%
Spring 2009-2012	57.7%	52.2%	37.8%

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Basic Skills Sequence:
During this program review cycle, the overall student success rate in all sections of Elementary Algebra (Math G010) increased by 7.2% while the success rate for all sections of Intermediate Algebra (Math G030) decreased from 48.7% in fall 2008 to 41.7% in spring 2012. The success rate for all sections in both courses has consistently been in the range of 41.5% to 44.5%.

Success Rate in Basic Skills Seq.

	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012
Math G010	35.0%	35.4%	32.2%	38.4%	34.7%	30.8%	34.6%	42.2%
Math G030	48.7%	53.8%	49.2%	47.8%	52.4%	43.4%	47.9%	41.7%
Both	42.3%	44.5%	41.5%	43.6%	44.0%	38.1%	42.2%	41.9%
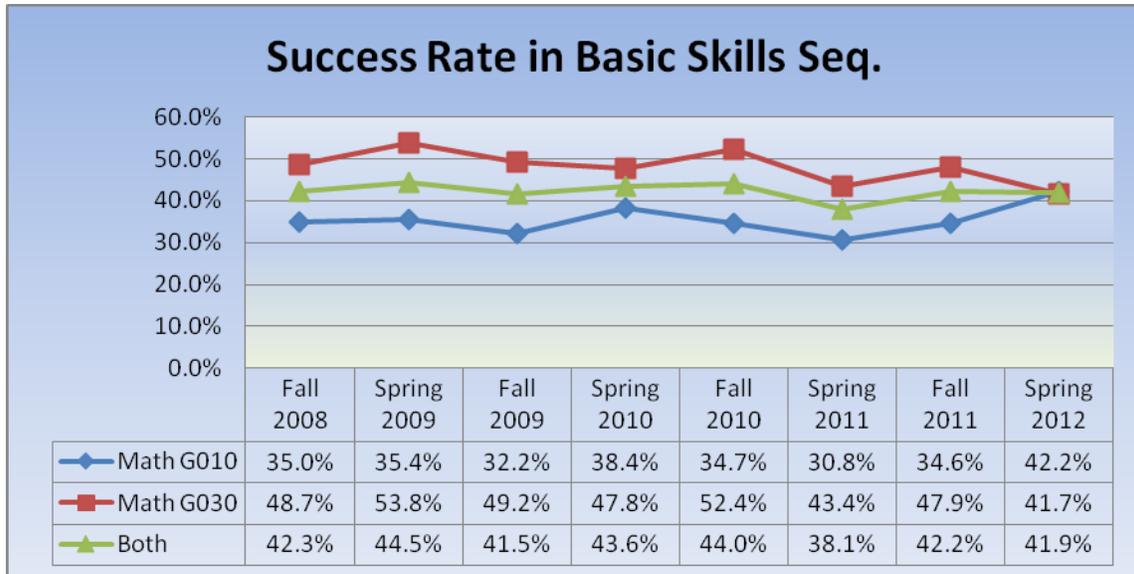
In contrast, closer examination of the data for Math G010 and Math G030 indicates that as class size increases, the overall student success rate in each course declines in each semester.

Overall Success Rates by Class Size in Math G010

	(1.5) 55-119	(2.0) 120-239
Fall 2008-2012	37.0%	33.0%
Spring 2009-2012	46.2%	30.4%

Overall Success Rates by Class Size in Math G030

	(1.5) 55-119	(2.0) 120-239
Fall 2008-2012	52.5%	47.4%
Spring 2009-2012	49.1%	43.8%

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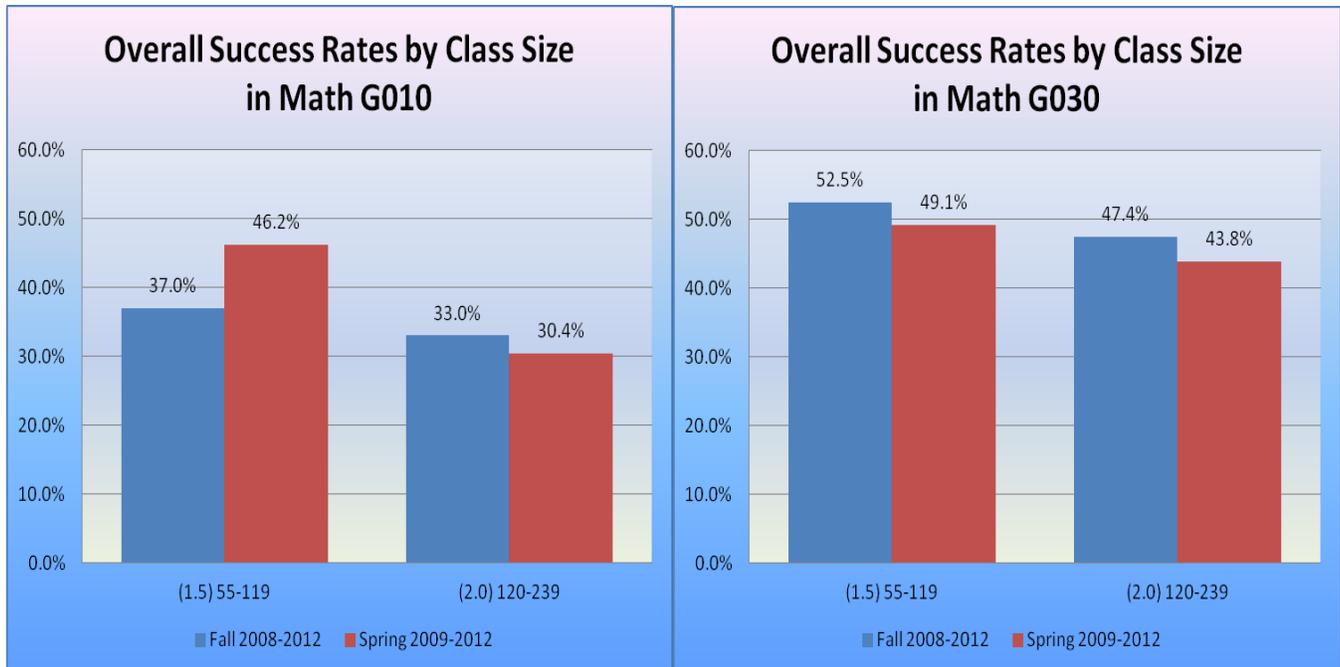
Although overall retention rates have consistently been above 70%, the rate is slightly lower in the spring semesters as compared to the fall semesters. In addition, the retention rate for all large class factor mathematics courses is less than that for classes with fewer than 55 students.

Overall Retention Rates by Class Size

Class Size	Fall 2008-2012	Spring 2009-2012
(1.0) <55	78.2%	77.2%
(1.5) 55-119	76.1%	74.6%
(2.0) 120-239	72.7%	67.6%
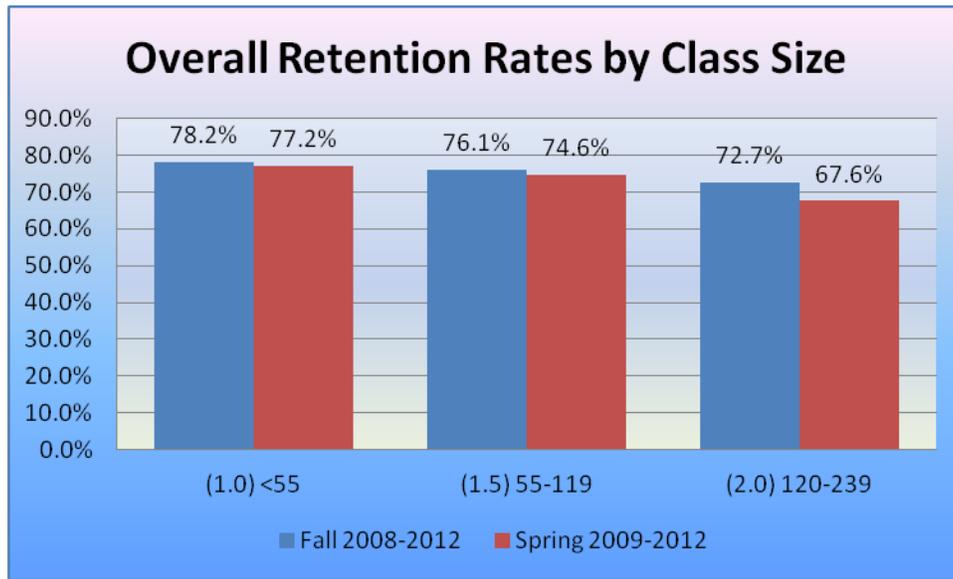
2. What are your analyses of the causes or reasons for those trends?

Enrollments and Full-Time Equivalent Students (FTES):
The reductions in the number of sections offered and FTES were necessary in order to address the budget shortfalls at the District and State levels. The FTES/FTEF ratio over this period has consistently been in the range of 51.7 to 58.0 students per faculty.

Student Success and Retention:
Although there is some variability in the success rates within the different sections of mathematics courses, the overall student success rates for all mathematics courses combined increased from 47.5% in fall 2008 to 53.6% in spring 2012, an increase of 6.1%. We attribute this increase to the fact that our faculty continues to provide the highest quality instruction for our students and provides the opportunity for our students to achieve their highest potential. Additionally, the integration of online programs and resources in the majority of mathematics courses allows for students to get the assistance and feedback they need to develop content mastery and greater course success. The variability in success rates can be attributed to many factors that are beyond the faculty or departments control. Many of our students enroll in mathematics courses not having an adequate prerequisite mathematics preparation, poor study and time management skills for college level course work, and lack sufficient self discipline to successfully complete a course. The large class sizes further limit the faculty, especially our part-time faculty, in their ability to engage with all their students in an effort to achieve greater success rates. As a result, many students fall through the cracks and do not persist to the next level.

Each semester, student success and retention rates for all mathematics courses decrease as the class sizes increase. In addition to many transfer-level mathematics courses, all sections of Elementary Algebra and Intermediate Algebra are offered at either 90 or 180 students per section. The data clearly indicates there is a direct association with the increase in class size and the lower student success and retention rates in these basic skills courses. Although there may be many factors that contribute to the lower success and retention

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rates for Large Class Factor (LCF) courses, the Mathematics Department faculty believes that a root cause of this problem is due to the fact that many of our first-year students are not prepared for college level mathematics and are in need of more remediation. We further compound the problem with our large remedial level class sizes. The department is confident that the lack of adequate support services and the minimal student engagement and collaboration in these LCF courses are hindering our efforts to achieve greater student success and retention rates. Additionally, the large class sizes in many mathematics courses have forced the department faculty to use computerized or objective testing methods making it very difficult to adequately assess course and program Student Learning Outcomes (SLOs).

3. What does your program do well?

The Mathematics Department offers a range of courses designed to prepare students for STEM and non-STEM majors, as well as remedial courses to prepare students for success at the college level. We are proud that our courses are taught with the appropriate rigor and prepare transfer students for success at their target institution.

While the department believes that large class sizes are an impediment to success, we continue to find effective ways to reduce the negative impact of extremely large class sizes. The Department does an excellent job of managing extremely large class sizes for remedial courses, such as Math G010 and Math G030. We utilize an on-line course management system, MyMathLab, which provides students with a variety of resources to help them master the course content. We also use a highly coordinated approach to these large classes, which allows us to collect and evaluate individual written work by each student every week.

The Mathematics Faculty at GWC seeks to improve student success by using methods of instruction that both experience and common sense indicate will benefit student learning. We feel it is important to try new instructional techniques when they fit within the parameters of our program and have the potential for benefitting student learning. For example, we are currently exploring ways of incorporating a student assistant in our remedial math classes to increase student interaction.

The department also pays special attention to our highest-level students including encouraging and supporting participation in the AMATYC math contest. This national contest provides our students with a chance to compete with community colleges across the nation to win scholarship money and recognition for their skill in mathematics. Golden West College recently ranked fifty-third out of one hundred and seventy-six community colleges participating nation wide. We believe this performance is a testament to the teaching excellence in our higher-level courses: i.e. Calculus, Linear Algebra, and Ordinary Differential Equations.

Lastly, our department provides tangible support to students by way of its ReyCarr Scholarship. Each year this perpetual program provides about $1,000 in support to our outstanding students.

4. What are the challenges to your program?

Beyond your program's control:
Our program continues to experience various challenges beyond our control. Some of these challenges include those associated with large class sizes, the need to hire additional qualified full-time faculty, and challenges with current technology.

The increased class size of our high demand courses (such as Math G010, Math G030, Math G115, and Math G160) has posed numerous challenges. The enrollment in these courses ranges in size from 70 to 180

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students per section, with a single instructor. Successful leadership, facilitation, and instruction in classes of sizes such as these requires a trained, qualified instructor whose standards are consistent with the level of quality required by our department. Over the past several years, the quantity of sections and size of each of these large-size classes has increased, while the quantity of full-time tenured and/or tenure-track faculty in the department has decreased (while the department did increase from six full-time faculty to seven in the fall of 2013, we remain undersized). Though several qualified adjunct faculty have been selected and trained to teach LCF courses, the department would be more effective at maintaining a consistent course structure and level of quality across all sections taught if we had the ability to staff more (or all) of these courses with full-time faculty.

Another challenge in a LCF course is the lack of instructor support inside the classroom. Many students come to GWC with deficient study and mathematics skills and thus do not even meet the minimum requirements to enroll in our transfer-level courses. As a result, they must remediate their algebra competency by first enrolling in either Math G010 or Math G030. In all sections of Math G010 or Math G030, there is one instructor in a classroom of 90 or 180 students. The data clearly shows the low success and completion rates of students in these large-sized basic skills courses. The addition of instructional assistants to provide individual help would be part of the solution to this problem. Our department (faculty and students) would greatly benefit from instructional support inside the classroom, such as the hiring of trained instructional assistants to facilitate and assist in class activities. They would serve as a bridge, bringing the remedial students up to speed in areas where they are deficient.

In addition, we continue to face the challenge of working with dated technology in our Math Lab. The Math Lab is used extensively by students enrolled in the LCF courses of Math G010 and Math G030 for weekly assessments, as well as by many students attending the open lab hours. We have concerns about the durability and efficiency of the current computers, and have experienced many occasions in which quizzes and/or exams have been disrupted due to technological difficulties. Also, the condition of Math/Sciences Room 219 is deteriorating and a number of machines in that room are not useable.

Along with the purchase of new computers and necessary hardware, the lab would benefit from the hiring of more student instructional assistants (SIA). Their job would be two-fold: provide tutoring to students enrolled in the remedial courses and assist the instructors during the lab hours associated with each class. With more support from the SIA during the lab hours, the instructor would be able to spend more time assisting students with greater difficulty in mastering the course content. Furthermore, with the assistance of the SIA, the instructor would be able to more appropriately utilize effective teaching strategies in large classes.

Within your program's control:
The Mathematics Department has experienced obstacles that we have had the ability to manage, such as the challenges associated with Student Learning Outcomes (SLOs), some of the difficulties in working with large class sizes, and challenges with the success and retention of our basic skills and transfer level students.

As the focus on Student Learning Outcomes is relatively new, our department is becoming more proficient with the issue. We have had control over establishing the definition of course SLOs as well as how we assess these SLOs. There is ongoing discussion on both topics, as well as how we use the SLOs for course improvement. Since official quantitative feedback on the assessment of course SLOs is now required for each course taught by all faculty members, our next challenge is to coordinate with and train all adjunct faculty in the assessment and reporting of SLOs. We plan to hold a mandatory all-faculty meeting prior to the fall 2013 semester in an effort to prepare our faculty to properly fulfill this necessity.

Since many of our courses have large enrollments, we are thus faced with the challenge of ensuring that each of these students is consistently offered the highest quality education. This has required a well-coordinated structure, established and continuously monitored by our department. Due to the small size of our full-time faculty team, the quantity of LCF courses offered exceeds the number we are able to staff with full-time tenure and/or tenure-track faculty members. Therefore, we have relied on skilled adjunct faculty to teach several of these courses. This has made the hiring, training, communication with and monitoring of new and returning part-time faculty members necessary. It is an ongoing collaborative effort, but we believe that the increase in our course success rates is evidence that our faculty continues to provide quality instruction with the intent that our students achieve their highest potential.

Our department continues in its efforts to address the success and retention rates of students in basic skills mathematics courses. In addition to the quality control of instruction provided in basic skills courses, there is ongoing discussion regarding programs, workshops, activities, and pedagogical approach aimed to improve the success of developmental math students. In addition, our department has a representative serving on the Strategies for Student's Success Committee, where there is ongoing discussion and initiatives addressing the concerns and issues with basic skills students.

However, challenges with success and retention are not limited to basic skills mathematics students. In our transfer level courses, we face the problem of many unprepared first-year students who come to us with poor study and mathematics skills. They especially suffer from deficiencies in their knowledge of both algebra and trigonometry. Addressing this challenge is a current discussion in our department.

5. What are the opportunities for your program?

Recognizing the need to increase student engagement, retention, and success rates in our remedial courses, the Mathematics Department continues to explore the integration of study skills and learning strategies into our Elementary and Intermediate Algebra courses. These efforts will be executed with the purpose of following official course outlines of record, preserving the integrity of our program, and implementing activities and exercises designed to reach the underprepared and/or at-risk basic skills students. The department is also exploring models of Supplemental Instruction (SI), which best fit our enrollment needs and challenges.

As innovative and academically sound grants and funded projects are presented to the department and to Golden West College, the Mathematics Department considers each opportunity in the light of our current resources and personnel and our department philosophies. The faculty is also mindful of the need to promote further interest and academic preparation in the areas of Science, Technology, Engineering and Mathematics.

With the addition of the curriculum management system CurricUNET, the Mathematics Department will acquaint full-time and part-time instructors with the software so that math faculty can access, review, and participate in any departmental modifications to course outlines of record. Also, instructors will be able to review SLOs and collaborate in departmental decisions regarding discipline curriculum.

Continued involvement in the reviews of C-ID mathematics course descriptors will alert the department to future curriculum issues and provide information about decisions and changes enacted by other California Community Colleges. Access to data regarding a variety of strategies and course patterns will help us face our own issues and delineate paths that model our philosophy of academic integrity and the pursuit of excellence in our program as well as our involvement in the fulfillment of the college's mission.

6. Identified areas in need of improvement:

The Mathematics Department will continue to research and incorporate strategies that will provide the opportunity for our students to successfully complete their math classes. Review and analysis of course SLOs and the teaching strategies used will provide the department with evidence to seek additional funding for instructional assistants and student support services for all LCF mathematics courses. Since it is unclear as to when LCF mathematics courses, especially at the basic skills level, will be reduced to appropriate class sizes, the department believes that adequate support and funding for supplemental instruction strategies will contribute to the continued improvement of our programs, student success, and completion rates.

The Mathematics Department will continue to improve on the assessments and review of SLOs for all mathematics courses and programs. The department will continue the collaboration with the department's part-time faculty by providing them with training on SLO assessments and continue the cooperation through analysis and review of the results for continued course and program improvements.

The Mathematics Department will continue to research alternative mathematics assessment and placement software for improved course level placement of new students to Golden West College. Pending adequate funding and administrative support, the department will continue to discuss and implement strategies for short-term basic skills mathematics remediation for our students. In addition, the department will analyze the data for all mathematics courses to identify and find solutions to problems in regards to the consistency of instruction and compliance with departmental standards and their effect on student success.

Program-Level Student Learning Outcomes (pSLOs) Assessed During 2010-12
Complete a separate page for each major and/or certificate you assessed.

Program Name:	Mathematics (Major)
Program Type:	(X) Transfer Major
	( ) Certificate of Achievement
	( ) Basic Skills Sequence
	( ) Area of Emphasis
	(X) Gen Ed Area B-4

Semester Assessed: ( ) Fall   (X) Spring   ( ) Winter   ( ) Summer

Year: 2012

Step 1	**Define the Expected Program Student Learning Outcome (pSLO).**	Graph equations in the rectangular, polar, cylindrical, and spherical coordinate systems, curves defined parametrically, conic sections, vectors, and vector valued functions.
Step 2	**What method did you use to assess the SLO?**	A free-response question was embedded in the course final exam. The same rubric was used by all instructors. A score of 70% (or above) on this question constituted satisfactory completion. Question: Evaluate $\int_C x^2 + xy\ ds$ where C is given by $\mathbf{r}(t) = \cos(2t)\mathbf{i} + \sin(2t)\mathbf{j}$ for $0 \le t \le \dfrac{\pi}{4}$.
Step 3	**Describe the results of your assessment.**	11/13 (84.6%) satisfactorily answered this question.
Step 4	**Describe your analysis of the data.**	The majority of the students successfully solved the problem.
Step 5	**What planning and changes will or have occurred, as a result of assessment and analysis of data, to improve student learning?**	Continue to introduce and explain material using the methods that lead to this successful result.

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Program-Level Student Learning Outcomes (pSLOs) Assessed During 2010-12
Complete a separate page for each major and/or certificate you assessed.

Program Name: Mathematics (Major)

Program Type:
(X) Transfer Major
( ) Certificate of Achievement
( ) Basic Skills Sequence
( ) Area of Emphasis
(X) Gen Ed Area B - 4

Semester Assessed: ( ) Fall   (X) Spring   ( ) Winter   ( ) Summer

Year:

Step 1	**Define the Expected Program Student Learning Outcome (pSLO).**	Apply concepts of differential and integral calculus of one or more variables to solve problems involving rates, area, volume, and lengths of arcs. (Math 180, Math 185, Math 280)
Step 2	**What method did you use to assess the SLO?**	Free response question on the final exam in Math 280
Step 3	**Describe the results of your assessment.**	7/13 (53.8%) satisfactorily answered this question.
Step 4	**Describe your analysis of the data.**	The majority of students who did not successfully complete this problem, incorrectly determined the limits of integration.
Step 5	**What planning and changes will or have occurred, as a result of assessment and analysis of data, to improve student learning?**	Spend more time explaining the determination of limits from a graph. Incorporate an activity involving determining limits of integration.

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Program-Level Student Learning Outcomes (pSLOs) Assessed During 2010-12

Complete a separate page for each major and/or certificate you assessed.

Program Name: Mathematics (Major)

Program Type:
(X) Transfer Major
( ) Certificate of Achievement
( ) Basic Skills Sequence
( ) Area of Emphasis
(X) Gen Ed Area B-4

Semester Assessed:
( ) Fall (X) Spring
( ) Winter ( ) Summer

Year: 2012

Step 1	**Define the Expected Program Student Learning Outcome (pSLO).**	Perform matrix operations, eigenvalue and eigenvector computations and applications. (Math 235)
Step 2	**What method did you use to assess the SLO?**	Free response question on the final exam
Step 3	**Describe the results of your assessment.**	17/20 (85%) of the students satisfactorily completed the questions.
Step 4	**Describe your analysis of the data.**	Students understood the problems and were able to apply the correct procedures to satisfactorily apply the assessed concepts.
Step 5	**What planning and changes will or have occurred, as a result of assessment and analysis of data, to improve student learning?**	• Continue to clearly explain the solving of the problem. • Continue to assess this SLO in the future.

Program-Level Student Learning Outcomes (pSLOs) Assessed During 2010-12

Complete a separate page for each major and/or certificate you assessed.

Program Name: Liberal Arts Math Emphasis

Program Type:
( ) Transfer Major
( ) Certificate of Achievement
( ) Basic Skills Sequence
(X) Area of Emphasis
(X) Gen Ed Area B-4

Semester Assessed:
( ) Fall   (X) Spring
( ) Winter   ( ) Summer

Year: 2012

Step 1	Define the Expected Program Student Learning Outcome (pSLO).	Compute derivatives of basic functions and the derivatives of their sums, differences, products, quotients, and compositions. (Math 140, Math 180, Math 185, Math 280).
Step 2	What method did you use to assess the SLO?	A free-response question was embedded in the course final exam. The same rubric was used by all instructors. A score of 70% (or above) on this question constituted satisfactory completion. Question: Find the curvature, $\kappa(t)$, of the curve given by $\mathbf{r}(t) = \langle \ln t, 2t, t^2 \rangle$. Simplify your answer.
Step 3	Describe the results of your assessment.	12/13 (92.3%) of the students completed this questions satisfactorily
Step 4	Describe your analysis of the data.	The majority of the students successfully solved the problem.
Step 5	What planning and changes will or have occurred, as a result of assessment and analysis of data, to improve student learning?	Continue to introduce and explain material using the methods that lead to this successful result.

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Program-Level Student Learning Outcomes (pSLOs) Assessed During 2010-12
Complete a separate page for each major and/or certificate you assessed.

Program Name: Liberal Arts Math Emphasis

Program Type:
( ) Transfer Major
( ) Certificate of Achievement
( ) Basic Skills Sequence
(X) Area of Emphasis
(X) Gen Ed Area B-4

Semester Assessed:
( ) Fall   (X) Spring
( ) Winter   ( ) Summer

Year: 2012

Step 1	**Define the Expected Program Student Learning Outcome (pSLO).**	Solve right and oblique triangles and use appropriate laws to solve applied problems. (Math 120, Math 170)
Step 2	**What method did you use to assess the SLO?**	Free-response question on the final exam. The same rubric was used by all instructors. ¾ points constituted satisfactory completion
Step 3	**Describe the results of your assessment.**	73/95 (77%) of the students completed this questions satisfactorily
Step 4	**Describe your analysis of the data.**	77% is an acceptable percentage for this SLO. The students needed to correctly formulate the problem and calculate the final answer (4 points). Even if the final answer was not correct, if the students correctly started the problem and made appropriate substitutions, they received a satisfactory for the problem.
Step 5	**What planning and changes will or have occurred, as a result of assessment and analysis of data, to improve student learning?**	Since the students have achieved at an acceptable rate, we will not necessarily assess this SLO in the next SLO assessment for this course.

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Program-Level Student Learning Outcomes (pSLOs) Assessed During 2010-12
Complete a separate page for each major and/or certificate you assessed.

Program Name:	Liberal Arts Math Emphasis
Program Type:	( ) Transfer Major
	( ) Certificate of Achievement
	( ) Basic Skills Sequence
	(X) Area of Emphasis
	(X) Gen Ed Area B-4

Semester Assessed: ( ) Fall (X) Spring ( ) Winter ( ) Summer

Year: 2012

Step 1	**Define the Expected Program Student Learning Outcome (pSLO).**	Perform matrix operations.
Step 2	**What method did you use to assess the SLO?**	• Orthogonally diagonalize the symmetric matrix (question on final exam) $$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$
Step 3	**Describe the results of your assessment.**	85.0% (17/20) students solved the problem correctly
Step 4	**Describe your analysis of the data.**	Students understood the problem and were able to apply the correct procedures to satisfactorily solve it.
Step 5	**What planning and changes will or have occurred, as a result of assessment and analysis of data, to improve student learning?**	• Continue to clearly explain the solving of the problem. • Continue to assess this SLO in the future.

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Program-Level Student Learning Outcomes (pSLOs) Assessed During 2010-12

Complete a separate page for each major and/or certificate you assessed.

Program Name: Liberal Arts Math Emphasis

Program Type:
( ) Transfer Major
( ) Certificate of Achievement
( ) Basic Skills Sequence
(X) Area of Emphasis
(X) Gen Ed Area B-4

Semester Assessed:
( ) Fall   (X) Spring
( ) Winter   ( ) Summer

Year: 2012

Step 1	**Define the Expected Program Student Learning Outcome (pSLO).**	Perform matrix operations.
Step 2	**What method did you use to assess the SLO?**	Given a matrix, find its rank and a basis for its row space and column space. A free-response question is inserted on the final exam.
Step 3	**Describe the results of your assessment.**	18/ 20 (90%) received a satisfactory score.
Step 4	**Describe your analysis of the data.**	Students understood the problem and were able to apply the correct procedures to satisfactorily solve.
Step 5	**What planning and changes will or have occurred, as a result of assessment and analysis of data, to improve student learning?**	• Continue to clearly explain the solving of the problem. • Continue to assess this SLO in the future.

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Program-Level Student Learning Outcomes for 2012-14

(List the 3-5 most important expected student learning outcomes to be assessed over the next two years.
Complete a separate page for each major and/or certificate you did not complete the assessment for the last 2 years.

Program Name: Mathematics Major (AA and AS-T)

Program Type:
(X) Transfer Major
( ) Certificate of Achievement
( ) Basic Skills Sequence
( ) Area of Emphasis
(X) Gen Ed Area   B-4

Semester to be Assessed:
(X) Fall   (X) Spring
( ) Winter   ( ) Summer

Year: 2013

Step 1	**Define the Expected Program Student Learning Outcome (pSLO).**	State and interpret the definition of integrals, and calculate definite and indefinite integrals involving basic and transcendental functions. (Math 180, Math 185)
Step 2	**What method did you plan to use to assess the SLO?**	Questions embedded in quizzes and/or exams
Step 3	**When is the assessment going to be done and who is going to conduct it?**	In the Spring and/or Fall of 2013, Individual instructors will assess the SLO in their classes (Math 180 and Math 185) and document their individual course results. They will then distribute share those results with the department faculty, and the department faculty will collaborate in the analysis and interpretation of the findings.

Program Name:	Mathematics Major (AA and AS-T)	**Semester to be Assessed:**	**Year:**
Program Type:	**(X) Transfer Major**	**(X) Fall (X) Spring**	
	( ) Certificate of Achievement		2013
	( ) Basic Skills Sequence	**( ) Winter ( ) Summer**	
	( ) Area of Emphasis		
	(X) Gen Ed Area B-4		

Step 1	Define the Expected Program Student Learning Outcome (pSLO).	Graph equations in the rectangular, polar, cylindrical, and spherical coordinate systems, curves defined parametrically, conic sections, vectors, and vector valued functions. (Math 170, Math 185, Math 280)
Step 2	**What method did you plan to use to assess the SLO?**	Questions embedded in quizzes and/or exams
Step 3	**When is the assessment going to be done and who is going to conduct it?**	In the Spring and/or Fall of 2013, Individual instructors will assess the SLO in their classes (Math 170, Math 185, and/or Math 280) and document their individual course results. They will then share their results with department faculty, and the department faculty will collaborate in the analysis and interpretation of the findings.

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Program Name: Math Emphasis in Liberal Arts

Program Type:
( ) **Transfer Major**
( ) **Certificate of Achievement**
( ) **Basic Skills Sequence**
(X) **Area of Emphasis**
(X) **Gen Ed Area   B-4**

Semester to be Assessed: (X) **Fall**   (X) **Spring**   ( ) **Winter**   ( ) **Summer**

Year: 2013

Step 1	**Define the Expected Program Student Learning Outcome (pSLO).**	Calculate probabilities of independent and mutually exclusive events and conditional probability using appropriate formulas and theorems. (Math 100, Math 103, Math 155, Math 160)
Step 2	**What method did you plan to use to assess the SLO?**	Questions embedded in quizzes and/or exams
Step 3	**When is the assessment going to be done and who is going to conduct it?**	In the Spring and/or Fall of 2013, individual instructors will assess the SLO in their classes (Math 100 and Math 160) and document their individual course results. They will then share their results with the department faculty, and the department will collaborate in the analysis and interpretation of the findings.

Program Name: Math Emphasis in Liberal Arts

Program Type:
( ) **Transfer Major**
( ) **Certificate of Achievement**
( ) **Basic Skills Sequence**
(X) **Area of Emphasis**
(X) **Gen Ed Area   B-4**

Semester to be Assessed: (X) **Fall**   (X) **Spring**   ( ) **Winter**   ( ) **Summer**

Year: 2013

Step 1	**Define the Expected Program Student Learning Outcome (pSLO).**	Solve first-order differential equations. (Math 185, Math 282).
Step 2	**What method did you plan to use to assess the SLO?**	Questions embedded in quizzes and/or exams
Step 3	**When is the assessment going to be done and who is going to conduct it?**	In the Spring and/or Fall of 2013, individual instructors will assess the SLO in their classes (Math 185 and Math 282) and document their individual course results. They will then share their results with the department faculty, and the department will collaborate in the analysis and interpretation of the findings.

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Resource Planning

Staffing: **What staff changes or additional employees does your program need to function adequately?**
  Faculty: at least 2 Full-Time Faculty
  Management: N/A
  Classified: at least 1 Full-Time Lab Coordinator
  Hourly: at least 2 assistants (am/pm)

Considering your current employees, what staff development/training does your program need?
  Training for all part-time math faculty in the assessment of course SLOs and collaboration with the department to review and discuss the results for course and program improvements.

Technology: **What improvements, changes or additions in equipment dedicated to your program are needed to function adequately?**
  Equipment or Software (e.g., computers, AV, lab equipment):
  1. Each semester, the Math Lab continues to serve many GWC math students that use the computers for their assignments and assessments during open lab hours. Newer computers in the Math Lab with the proper installation of needed software would be necessary to minimize equipment failures and for the department to continue the highly coordinated and efficient manner in which the LCF remedial courses are conducted.

  2. Many of the classrooms in the math-science building, where the majority of math classes are taught, have outdated or non-functioning padcams. Padcams are regularly used by many instructors and in some cases, it's a necessary equipment to accommodate an instructor who may have difficulty writing on the whiteboard due to injuries or other health conditions. Installation of new padcam equipment in mathematics classrooms would help to improve instruction.

  3. The full-time faculty of the department would like to pilot the use of wireless tablets in the LCF mathematics courses to incorporate more effective instructional strategies. Proper installation of the equipment necessary to get the most functional use of the tablet in the classroom would allow for the instructor to be mobile throughout the large classes and increase student engagement while continuing to present the content.

  Technical Infrastructure (e.g., AV or computer infrastructure, cabling):
  In addition to continued maintenance of all AV equipment in math classes, adequate infrastructure and configuration of Math Lab computers for the fastest and most stable access to the internet is necessary to minimize technical interruptions during Math Lab hours of service.

Facilities: **What improvements or changes to the facilities would you need to function adequately?**
  Physical Concerns (e.g. electrical, gas, water, foundation, space, ventilation).
  Math building roof continues to be patched to prevent rain drainage into the math lab (and onto computers). Continue to monitor for reoccurrence of more leaks.

Other: **What changes or other additions need to be made to your program to function adequately?**
  1. The reduction of the two LCF sections of Elementary Algebra and the two LCF sections of Intermediate Algebra from 180 students to 90 students (45 students for each lab section) would be a good start to the reduction of LCF mathematics courses, especially in the area of basic skills mathematics.

2. Adequate instructional support assistants for all LCF mathematics sections through an adequately funded and sustainable SIA program would be a positive step towards our efforts in increasing our students success and completion rates.

IUA and Dean Review

Complete this section after reviewing all program review information provided. IUA and Dean are to separately indicate the level of concern for the program that exists regarding the following Program Vitality Review (PVR) criteria. Add comments for any item marked with a 1 or 2. Identify whether the comment is made by the IUA or the Dean.

(Scale: 0 – No concern at all, 1 – Some concern, 2 – Serious Concern)

IUA/Dean

(0) (0)   a. Significant declines in enrollment and/or FTES over multiple years

(2) (2)   b. Significant change in facility and/or availability and cost of required or necessary equipment

> *IUA: More math lab computers are failing with no replacement computers available. Replacement of all math lab computers is essential to our program.*

(1) (1)   c. Scarcity of qualified faculty

> *IUA: Additional full-time faculty who can effectively teach and manage LCF sections, hold office hours, and contribute to the department and college goals will improve our programs.*

(0) (0)   d. Incongruence of program with college mission and goals, state mandates, etc

(0) (0)   e. Significant decline in labor market

(0) (0)   f. Continued inability to make load for full-time faculty in the program

(0) (0)   g. An over-saturation of similar programs in the district and/or region

(2) (2)   h. Other Large Class Factor Assistants

> *IUA: Instructors and students in LCF sections need adequate instructional aide and support services throughout the semester.*

Program Review Check-list

(X)   Department Contact Information is up to date: Department Chairs, full-time faculty, classified

(X)   Organization Chart: Verify that it is up to date: (q:\college information\org charts) Report necessary changes to the Director of Personnel

(X)   Both the Dean and IUA have completed the Dean and IUA Review section.

Signatures, Individual Comments

Department Chair: Pete Bouzar   Date: 4/30/13
Comments:

Division Dean: Jeff Courchaine   Date: 4/30/13
Comments:

(X) No further review necessary

( ) We recommend this program for Program Vitality Review

I have read the preceding report and accept the conclusions as an accurate portrayal of the current status of the program. Signatures are on file in the division office. Type the names of the faculty.

(x) Pete Bouzar
(x) John Dunham
(x) Antony Hoang
(x) Lindsay Lewis
(x) Doug Lloyd
(x) David Marino
(x) Linda Ternes

I have read the preceding report and wish to add signed comments to the appendices.
Signatures are on file in the division office.
( )
( )
( )
( )
( )

Appendices

- A. Data Sets
- B. Signed Comments
- C. Classified Position Requests
- D. Faculty Position Requests
- E. General Fund One-Time Funds Requests
- F. Curriculum Inventory
- G. SLO Inventory