

**Georgia Southwestern State University
General Education Attainment Report
2015-2016**

November 18, 2016

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Overview2
Area A1 Written Communication4
Area A2 Problem Solving.....7
Critical Thinking 11
Appendix A: GSW General Education Attainment Plan..... 13
Appendix B: GSW-eCore SLO Comparison-Alignment.....16

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Georgia Southwestern State University
Americus, Georgia 31709

OVERVIEW

Assessment of general education outcomes is conducted according to the procedures outlined in the General Education Manual (see the appendix for complete plan). These procedures provide for assessment of outcomes on a three-year rotation. During academic year 2015-15 outcomes were assessed for Area A1 Written Communication, Area A2 Problem Solving, and the Critical Thinking Overlay.

Samples of essays composed in ENGL 1101 Composition I and ENGL 1102 Composition II were used to judge attainment on the approved Area A1 outcome “Students will be able to write effectively for a variety of audiences to demonstrate collegiate level writing development in various contexts” were assessed from both fall term 2015 and spring term 2016. The level of attainment was assessed by a team of composition instructors who applied the GSW Written Communication Rubric to artifacts from both ENGL 1101 and ENGL 1102 that had been stripped of identifying information, such as student and instructor names.

The eCore administration also provided GSW with assessment results for GSW students who completed eCore ENGL 1101 and ENGL 1102 courses during fall term 2015. While the methodology of assessment is different from GSW’s, the results are provided for transparency and judicious comparison.

A final exam problem that was embedded on the exams in MATH 1101, MATH 1111, MATH 1113, and MATH 1120 was used the gauge attainment of the learning outcome for Area A2: “Students will be able to analyze and apply mathematical concepts in various forms in order to solve a variety of quantitative problems.” A team of Mathematics Faculty assessed a sample of artifacts from all four sections using a five point scale indicating level of proficiency.

The eCore administration also provided GSW with assessment results for GSW students who completed eCore MATH 1101, MATH 1111, and MATH 1113 courses during fall term 2015. No GSW students took eCore Math 1501 (Calculus I) during the term. While the methodology of assessment is different from GSW’s, the results are provided for transparency and judicious comparison.

Samples of essays composed in ENGL 1101 Composition I and ENGL 1102 Composition II were also used to judge attainment on the Critical Thinking Learning Outcome: “Students will be able to analyze and evaluate the main issues that relate to problems or texts, and then apply an organized, coherent and accurate response.” The level of attainment was assessed by a multidisciplinary team of instructors who applied the GSW Critical Thinking Rubric to artifacts from both ENGL 1101 and ENGL 1102 that had been stripped of identifying information, such as student and instructor names.

Results and analysis of results are presented below by area.

General Note: During the 2015-16 academic year, the Georgia Board of Regents voted to discontinue the US Perspectives, Global Perspectives, and Critical Thinking Overlay requirements. As a result, it has been decided to no longer assess attainment of the learning outcomes associated with the US Perspectives and Global Perspectives Overlays. In addition, the Institutional

Effectiveness Committee's Critical Thinking Task Force has been assigned the task of determining whether to continue assessing attainment on the learning outcome associated with critical thinking.

Assessment of Attainment for Core Area A1 Written Communication

Learning Outcome: Students will be able to write effectively for a variety of audiences to demonstrate collegiate level writing development in various contexts

Results

ENGL 1101 - Written Communication

Question	Capstone		Milestone 2		Milestone 1		Benchmark		Below Benchmark		Total
Context and Purpose of Writing	0.00%	0	14.89%	7	34.04%	16	42.55%	20	8.51%	4	47
Content Development	0.00%	0	14.89%	7	27.66%	13	44.68%	21	12.77%	6	47
Genre and Disciplinary Conventions	0.00%	0	12.77%	6	21.28%	10	44.68%	21	21.28%	10	47
Sources and Evidence	0.00%	0	12.77%	6	23.40%	11	53.19%	25	10.64%	5	47
Control of Syntax and Mechanics	0.00%	0	17.02%	8	31.91%	15	31.91%	15	19.15%	9	47

Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count	Bottom 3 Box	Top 3 Box
Context and Purpose of Writing	2.00	5.00	3.45	0.85	0.72	47	48.94%	85.11%
Content Development	2.00	5.00	3.55	0.89	0.80	47	42.55%	85.11%
Genre and Disciplinary Conventions	2.00	5.00	3.74	0.93	0.87	47	34.04%	87.23%
Sources and Evidence	2.00	5.00	3.62	0.84	0.70	47	36.17%	87.23%
Control of Syntax and Mechanics	2.00	5.00	3.53	0.99	0.97	47	48.94%	82.98%

ENGL 1102- Written Communication

Question	Capstone	Milestone 2	Milestone 1	Benchmark	Below Benchmark	Total
Context and Purpose of Writing	0.00% 0	18.75% 15	27.50% 22	50.00% 40	3.75% 3	80
Content Development	0.00% 0	13.75% 11	27.50% 22	40.00% 32	18.75% 15	80
Genre and Disciplinary Conventions	0.00% 0	11.25% 9	28.75% 23	42.50% 34	17.50% 14	80
Sources and Evidence	0.00% 0	11.25% 9	33.75% 27	43.75% 35	11.25% 9	80
Control of Syntax and Mechanics	0.00% 0	18.75% 15	36.25% 29	32.50% 26	12.50% 10	80

Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count	Bottom 3 Box	Top 3 Box
Context and Purpose of Writing	2.00	5.00	3.39	0.83	0.69	80	46.25%	81.25%
Content Development	2.00	5.00	3.64	0.94	0.88	80	41.25%	86.25%
Genre and Disciplinary Conventions	2.00	5.00	3.66	0.89	0.80	80	40.00%	88.75%
Sources and Evidence	2.00	5.00	3.55	0.84	0.70	80	45.00%	88.75%
Control of Syntax and Mechanics	2.00	5.00	3.39	0.93	0.86	80	55.00%	81.25%

Analysis

The results do not show much difference between ENGL 1101 and ENGL 1102. If anything the results for ENGL 1102 are slightly lower than the results from ENGL 1101. This result appears to be consistent with data that shows DFWI rates are higher in ENGL 1102 than in ENGL 1101. The underlying reasons for this apparent disparity are unclear at this time, but bear further consideration.

GSW Area A1 eCore Results

The table below compares the assessment results for GSW student who took Area A1 eCore courses during fall term 2015 with those of all students who took the same courses during the same term.

Courses	N=	GSW Exceeds	GSW Met	GSW Did Not Meet	N=	Total Exceeds	Total Met	Total Did Not Meet
ENGL 1101	6	100%	0%	0%	1107	53%	39%	8%
ENGL 1102	16	44%	56%	0%	1476	40%	50%	10%

Assessment of Attainment for Area A2 Problem Solving

Area A2 Outcome: Students will be able to analyze and apply mathematical concepts in various forms in order to solve a variety of quantitative problems

For the Fall 2014 - Spring 2015 Academic Year, the Mathematics Department evaluated the proficiency of core level mathematics students in solving a single problem based on the content of each separate course in the core, MATH 1101 [Elementary Mathematical Modeling], MATH 1111 [College Algebra], MATH 1113 [Precalculus], and MATH 1120 [Calculus I]. The exception is Math 1111. The Math 1111 question was delivered as multiple choice, which did not allow for assessing understanding with the given rubric with the same refinement as in the remaining courses. It was decided to use for Math 1111 Final Exam performance to assess overall understanding, with grades of A, B, C, and D (on a 90-80-70-60 scale) assigned as 5,4, 3, and 2, respectively. Scores between 50% and 59.9% were assigned 1 on the rubric, and scores below 50% as 0.

The assessment used the five-point rubric spelled out in the General Core Assessment Document, and reproduced in a footnote [1] below. The results are presented below, both as a combined assessment of all these courses, and for individual courses separately. Notice that 48% of students in Mathematics core courses had little or no proficiency in solving a content-based problem. The situation was somewhat similar for the individual courses MATH 1101, 36%; MATH 1111, 59%; MATH 1113, 46%; MATH 1120, 46%. These numbers are comparable to those for corresponding courses taken in 2011-2012, with improvements of approximately 14%-18% in MATH 1120 and MATH 1101, an improvement of 2% in MATH 1111, and a decrease of 14% for MATH 1113.

Following up, the Department will continue to address this issue in a number of ways: more emphasis on translation of problems into symbolic language and on practical problem solving methods. In addition, the faculty will try to sharpen problem-solving skills by requiring that students include explanations to justify steps in the problem-solving process. One credit hour labs for MATH 1111 and MATH 1101 were instituted starting in the 2011-2012 Academic Year to support student success in these courses. Participation in the lab sections is mandatory for students based originally on a cut-off on the Math Placement Test for new students, and more recently based on a cut-off on the new Math Placement Index that has replaced the Placement Test. Lab participation is optional for other students. We note that the Department of Mathematics is moving to adopt a new rubric for upcoming Assessment cycles to better assess our core-level courses and make evidence-based decisions to improve student success in these courses.

Combined Assessment (All four classes weighted equally)

<u>2014-2015</u> (4 classes; 71 artifacts)	<u>2011-2012</u>
5. 18%	5. 15%
4. 16%	4. 11%
3. 19%	3. 23%
2. 11%	2. 10%
1. 21%	1. 15%
0. 16%	0. 26%

Individual Course Assessment

MATH 1101 (19 artifacts)

<u>2014-2015</u>	<u>2011-2012</u>
5. 26%	5. 6%
4. 11%	4. 19%
3. 26%	3. 25%
2. 5%	2. 6%
1. 26%	1. 19%
0. 5%	0. 25%

MATH 1111 (24 artifacts)

<u>2014-2015</u>	<u>2011-2012</u>
5. 4%	5. 22%
4. 17%	4. 0%
3. 21%	3. 17%
2. 17%	2. 13%
1. 21%	1. 22%
0. 21%	0. 26%

MATH 1113 (13 artifacts)

<u>2014-2015</u>	<u>2011-2012</u>
5. 23%	5. 14%
4. 15%	4. 18%
3. 15%	3. 36%
2. 8%	2. 7%
1. 15%	1. 11%
0. 23%	0. 14%

MATH 1120 (15 artifacts)

<u>2014-2015</u>	<u>2011-2012</u>
5. 20%	5. 16%
4. 20%	4. 8%
3. 13%	3. 12%
2. 13%	2. 12%
1. 20%	1. 12%
0. 13%	0. 40%

Individual Course Assessment – Faculty Commentary

Each faculty member conducting an assessment compared the numbers for 2011-2012 with 2014-2015 in the course that he assessed. The faculty member then provided interpretations of the data or possible reasons for changes or stability in figures for the course assessed. Recorded below are the results.

Math 1101: “In Math 1101, the percentage of students rating at 3 remained essentially the same for 2011-2012 as for 2014-2015. In 2014-2015, a greater percentage of students placed at 4-5 than in

2011-2012, while a smaller percentage of students placed in the 0-2 range in 2014-2015 than in 2011-2012.

A possible reason is that Math 1101 first ran at GSW in Summer 2011, and so was new to students in 2011-2012. It is believed by the instructor that some weaker students attempted to take Math 1101 early on in an attempt to avoid Math 1111, creating a larger pool of students who struggled in Math 1101. Students may now be more aware that both courses require work, and not select Math 1101 over Math 1111 simply because of perceived mathematical weakness.

For Math 1101, success rates in 2014-2015 varied according as the section was online or in-class. For the selected problem, online students scoring 2 or below comprised 56% of their group of 9 students while those scoring 2 or below in the live section comprised 20% of the 10 test-takers in that section. Also, 11% of online students placed in the 4-5 range compared to 60% of the live section. This suggests that students in the live section benefitted from the in-class structure and increased student-teacher interaction. A larger number of live section students versus online students tend to populate the Math Modeling Labs and may benefit from this support class. ”

Math 1111: “The assessment in my College Algebra class was slightly higher in the number of students who received a passing grade. Below are my observed reasons why the success rates increased:

1. Students had a better attendance rate across the entire class
2. More students attended the extra lab sessions that I presented outside of the mandatory lab
3. The students exuded enthusiasm in class lectures and discussions
4. A large percentage of the student enrollment in this class was prepared to take College Algebra”

Math 1113: “For Math 1113 Precalculus, in 2014-2015, there were more students in the failing range (in terms of the selected question), but also there were more students in the area of being able to solve the questions. I thought one reason could be some students did not choose or were placed in the right class that matched their knowledge level. Some students wanted to avoid the challenge of Math 1111 College Algebra and went to Precalculus directly. Another key reason could be the less preparedness and lack of motivation or efforts among students in recent years.”

N.B.: At the direction of Administration, the Math Placement Test for new students has been discontinued, and was replaced in Fall 2016 with a Math Placement Index (MPI) taking into account math SAT score and high school GPA. The new MPI will affect initial placement of students in math courses from Fall 2016 onwards, and may thus impact student success in these courses. Future assessment cycles may compare their data with the data in this assessment cycle.

Math 1120: “The “numbers” look very consistent and remain almost the same except the “0” score. The change for the proportion of students in score “0” might be due to a reason that students were given more group work in class.”

Samples of student work, with rubric scores, are stored as separate PDF files, one for each randomly selected class per course.

[1] Rubric for Mathematics [5 point scale]

- 5. Solves the given problem, and in a way which has a wider range of applicability. (A, B)
- 4. Solves the given problem. (A, B)
- 3. Understands the given problem and attempts to solve it, but fails to get an acceptable solution. (C)
- 2. Shows evidence of understanding the problem, but does not attempt to solve it. (D)
- 1. Fails to understand the problem, but attempts a solution. (F)
- 0. Does nothing or submits an attempt that suggests little effort. (F)

GSW Area A2 eCore Results

The table below compares the assessment results for GSW student who took Area A2 eCore courses during fall term 2015 with those of all students who took the same courses during the same term.

Courses	N=	GSW Exceeds	GSW Met	GSW Did Not Meet	N=	Total Exceeds	Total Met	Total Did Not Meet
MATH 1101	1	0%	0%	100%	134	27%	41%	32%
MATH 1111	25	60%	24%	16%	2076	44%	31%	14%
MATH 1113	4	0%	0%	100%	902	20%	38%	42%

Assessment of Attainment for Critical Thinking

Outcome: Students will be able to analyze and evaluate the main issues that relate to problems or texts, and then apply an organized, coherent and accurate response

Results

ENGL 1101 - Critical Thinking

Question	Capstone		Milestone 2		Milestone 1		Benchmark		Below Benchmark		Total
Explanation of Issues	2.27%	1	9.09%	4	31.82%	14	31.82%	14	25.00%	11	44
Evidence	2.27%	1	2.27%	1	31.82%	14	45.45%	20	18.18%	8	44
Influence of Context and Assumptions	2.33%	1	2.33%	1	9.30%	4	51.16%	22	34.88%	15	43
Student's Position	2.27%	1	4.55%	2	18.18%	8	54.55%	24	20.45%	9	44
Conclusions and related Outcomes	2.27%	1	2.27%	1	20.45%	9	52.27%	23	22.73%	10	44

Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count	Bottom 3 Box	Top 3 Box
Explanation of Issues	1.00	5.00	3.68	1.02	1.04	44	43.18%	88.64%
Evidence	1.00	5.00	3.75	0.86	0.73	44	36.36%	95.45%
Influence of Context and Assumptions	1.00	5.00	4.14	0.85	0.72	43	13.95%	95.35%
Student's Position	1.00	5.00	3.86	0.87	0.75	44	25.00%	93.18%
Conclusions and related Outcomes	1.00	5.00	3.91	0.85	0.72	44	25.00%	95.45%

ENGL 1102 - Critical Thinking

Question	Capstone		Milestone 2		Milestone 1		Benchmark		Below Benchmark		Total
Explanation of Issues	0.00%	0	7.41%	6	27.16%	22	43.21%	35	22.22%	18	81
Evidence	0.00%	0	3.70%	3	25.93%	21	39.51%	32	30.86%	25	81
Influence of Context and Assumptions	0.00%	0	1.25%	1	12.50%	10	42.50%	34	43.75%	35	80
Student's Position	0.00%	0	2.47%	2	23.46%	19	41.98%	34	32.10%	26	81
Conclusions and related Outcomes	0.00%	0	2.47%	2	19.75%	16	43.21%	35	34.57%	28	81

Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count	Bottom 3 Box	Top 3 Box
Explanation of Issues	2.00	5.00	3.80	0.87	0.75	81	34.57%	92.59%
Evidence	2.00	5.00	3.98	0.85	0.72	81	29.63%	96.30%
Influence of Context and Assumptions	2.00	5.00	4.29	0.73	0.53	80	13.75%	98.75%
Student's Position	2.00	5.00	4.04	0.81	0.65	81	25.93%	97.53%
Conclusions and related Outcomes	2.00	5.00	4.10	0.80	0.63	81	22.22%	97.53%

Analysis

Despite the fact that no ENGL 1102 artifacts were judged to have attained the capstone level on any element of the GSW Critical Thinking Rubric, the mean scores on all elements were slightly higher the artifacts from ENGL 1102 than those from ENGL 1101. These data suggest that a slight improvement in critical thinking occurred between the end of ENGL 1101 and the end of ENGL 1102.

Appendix A: GSW General Education Attainment Plan

Learning Outcome(s)	Outcome Measures	Review of Data
<p>Area A1 (2015-16): Students will be able to write effectively for a variety of audiences to demonstrate collegiate level writing development in various contexts</p>	<p>Baseline Assessment: Argumentative Essay in ENGL 1101 Composition I</p> <p>Attainment Assessment: Final Project in ENGL 1102 Composition II</p> <p>Both assessments carried out using the AACU Value Rubric for Written Communication</p>	<p>Outcome data reviewed by the Department of English and Modern Languages Assessment Committee and the Committee on Academic Affairs General Education Review Subcommittee once every three years</p>
<p>Area A2 (2015-16): Students will be able to analyze and apply mathematical concepts in various forms in order to solve a variety of quantitative problems</p>	<p>Assessment of course-appropriate problem on the final exam in each targeted Mathematics course</p> <p>Problem assessed using GSW Rubric for General Education Mathematics</p>	<p>Outcome data reviewed by the Department of Mathematics faculty and the Committee on Academic Affairs General Education Review Subcommittee once every three years</p>
<p>Area B (2017-18): Students will be able to evaluate information critically</p> <p>Students will be able to understand cultural differences</p>	<p>Assessment of final project in LIBR 1101 Information Literacy</p> <p>Project assessed using GSW Area B Information Literacy Rubric</p> <p>Assessment of final project in WMST 2001</p> <p>Project assessed using GSW Area B Intercultural Knowledge Rubric</p>	<p>Outcome data reviewed by the Library faculty and by Committee and the Committee on Academic Affairs General Education Review Subcommittee once every three years</p> <p>Outcome data reviewed by the Women’s Studies faculty and by Committee and the Committee on Academic Affairs General Education Review Subcommittee once every three years</p>
Learning Outcome(s)	Outcome Measures	Review of Data
<p>Area C (2016-17): Students will be able to articulate factual and conceptual knowledge concerning humanities and fine arts</p>	<p>Assessment of an essay question on the final exam for English Courses in Area C</p> <p>Essays assessed using the GSW Area C Assessment Rubric</p>	<p>Outcome data reviewed by the Department of English and Modern Languages Assessment Committee and the Committee on Academic Affairs General Education Review Subcommittee once every three</p>

		years
<p>Area D (2017-18): Students will be able to interpret symbolic representations of data relevant to the physical world</p> <p>Students will be able to evaluate the relationship between observation and inference in the natural Sciences</p>	<p>Assessment questions included on Final Exam in Biology, Geology, and Physics courses that evaluate the students' ability to (1) interpret graphical data, (2) evaluate relationships from the graph and (3) predict relationships from the graph</p> <p>Questions assessed using GSW Area D Assessment Rubric</p>	<p>Reviewed once every three years by the Biology, Geology, and Physics faculty and by the Committee on Academic Affairs General Education Review Subcommittee</p>
<p>Area E (2016-17): Students will be able to articulate factual and conceptual knowledge concerning societal dynamics</p>	<p>Assessment of final exam questions in HIST 1111, HIST 1112, HIST 2111, HIST 2112, and POLS 1101</p> <p>Questions assessed using course specific rubrics</p>	<p>Outcome data reviewed once every three years by the Department of History and Political Science faculty and by the Committee on Academic Affairs General Education Review Subcommittee</p>
<p>US Perspectives (2016-17): Students will be able to articulate factual and conceptual knowledge concerning historical and societal dynamics within the United States</p>	<p>Assessment of final exam questions in HIST 2111, HIST 2112 & POLS 1101</p> <p>Questions assessed using the GSW US Perspectives Assessment Rubric</p>	<p>Outcome data reviewed once every three years by the Department of History and Political Science faculty and by the Committee on Academic Affairs General Education Review Subcommittee</p>
<p>Global Perspectives (2017-18): Students will be able to articulate factual and conceptual knowledge concerning world-wide societal dynamics</p>	<p>Assessment of final exam questions in HIST 1111 & HIST 1112</p> <p>Questions assessed using the GSW Global Perspectives Assessment Rubric</p>	<p>Outcome data reviewed once every three years by the Department of History and Political Science faculty and by the Committee on Academic Affairs General Education Review Subcommittee</p>
<p>Learning Outcome(s)</p>	<p>Outcome Measures</p>	<p>Review of Data</p>
<p>Critical Thinking (2015-16): Students will be able to analyze and evaluate the main issues that relate to problems or texts, and then apply an</p>	<p><i>Baseline Assessment: Argumentative Essay in ENGL 1101 Composition I</i></p> <p><i>Attainment Assessment: Final Project in ENGL 1102 Composition II</i></p>	<p><i>Outcome data reviewed by the Department of English and Modern Languages Assessment Committee and by the Committee on Academic Affairs General Education Review</i></p>

<i>organized, coherent and accurate response</i>	<i>Both assessments carried out using the AACU Value Rubric for Critical Thinking</i>	<i>Subcommittee once every three years</i>
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Appendix B: GSW-eCore SLO Comparison-Alignment

Area A 1

GSW A1 Area Learning Outcome: Students will be able to write effectively for a variety of audiences to demonstrate collegiate level writing development in various contexts

GSW ENGL 1101 SLOs	eCore SLOs
Students completing this course should be able to:	Students completing this course should be able to:
effectively communicate ideas related to assigned material in both a written and oral form;	Write a narrative essay.
write well-defined and adequately developed expository essays;	Plan writing in light of situation, audience, and purpose.
demonstrate a comprehension of assigned readings;	When writing an essay, employ a format and structure appropriate to the rhetorical situation.
integrate source information in selected writing assignments;	Write clear and complete sentences using standard English and grammar.
demonstrate ability to use correctly MLA format and documentation standards;	
recognize and use standard grammar, diction, and mechanics.	

GSW ENGL 1102 SLOs	
Students completing this course should be able to:	Students completing this course should be able to:
write longer and more sophisticated essays than in Composition I with the continued emphasis on writing and reading;	Write well-developed, logically-organized essay.
discuss and analyze assigned texts in-depth;	Use the writing process to understand different texts.
use techniques of researching, reporting, and documenting a thesis;	Plan and conduct a research project using a variety of research sources.
demonstrate scholarly source integration and synthesis in selected writing assignments.	

Area A2

GSW A2 Area Learning Outcome: Students will be able to analyze and apply mathematical concepts in various forms in order to solve a variety of quantitative problems

GSW MATH 1101	eCore MATH 1101
Students will be able to develop and use simple models based on data sets and elementary functions.	Students will be able to understand the concept and basic properties of functions; linear functions; quadratic functions; polynomial functions; logarithmic functions; and piecewise functions
Students will become adept at using mathematics in graphical, numerical, symbolic and verbal form, along with appropriate technology to explore real world data.	
Students will understand what can and cannot be inferred from mathematical models.	
Students will develop an appreciation for mathematics and its use in understanding the world.	

GSW MATH 1111	eCore MATH 1111
Students completing this course should be able to:	Students completing this course should be able to:
Express relationships using the concept of a function and use verbal, numerical, graphical and symbolic means to analyze a function	Model situations from a variety of settings in generalized mathematical forms.
Model situations from a variety of settings by using polynomial, exponential and logarithmic functions	Express and manipulate mathematical information, concepts, and thoughts in verbal/numeric/graphical/symbolic form while solving a variety of problems. Solve multiple-step problems through different (inductive, deductive, and symbolic) modes of reasoning.
Manipulate mathematical information, concepts, and thoughts in verbal, numeric, graphical and symbolic form while solving a variety of problems that involve polynomial, exponential or logarithmic functions	Shift among the verbal, numeric, graphical, and symbolic modes of considering relationships.
Apply a variety of problem-solving strategies, including verbal, algebraic, numerical, and graphical techniques to solve multiple-step problems involving polynomial, exponential, and logarithmic equations, inequalities, and systems of linear equations	Extract quantitative data from a given situation, translate the data into information in various modes, evaluate the information, abstract essential information, make logical deductions, and arrive at reasonable conclusions.

Shift among the verbal, numeric, graphical and symbolic modes in order to analyze functions	
Use appropriate technology in the evaluation, analysis and synthesis of information in problem-solving situations	

GSW MATH 1113	
Students completing this course should be able to:	Students completing this course should be able to:
Identify the inherent restrictions on the domain of a function.	Identify the characteristics of various functions.
Identify the range of a function.	Sketch and analyze the graphs of algebraic, trigonometric, exponential, logarithmic, and inverse trigonometric functions. Set up and solve word problems using algebraic, trigonometric, exponential, logarithmic, and inverse trigonometric functions.
Understand the interconnectedness of various modes of defining a function (numeric, graphical, generalized) and be able to analyze functions from numeric, graphical, and symbolic points of view; shift among them when appropriate; and justify this through inductive or deductive reasoning;	Solve equations using algebraic, trigonometric, exponential, logarithmic, and inverse trigonometric functions.
Be capable through inductive and deductive reasoning of moving from one to another of those modes of definition;	
Recognize and apply appropriate functions to solve a variety of applied problems.	

GSW MATH 1120	eCore MATH 1501
Students will have an understanding of one variable functions in a modeling context, of limits, and be able to test a variety of functions for continuity and differentiability.	Limits and Continuity: Calculate and evaluate limits and represent these concepts graphically, algebraically, numerically, and in words. Apply knowledge of limits and continuity to analyze and solve real-world problems. Determine when the use of technology is appropriate in solving problems related to limits and continuity, and how to apply the technology.
Students will be able compute derivatives of standard functions using the definition of derivative, and the rules of differentiation.	Derivatives and Differential: Explain the definition of derivative and how it is related to tangent lines and rates of change, and compute derivatives from the limit

	<p>definition. Compute derivatives using all of the standard rules, displaying in particular a strong mastery of the Chain Rule. Compute derivatives of trigonometric functions and compute closely related trigonometric limits. Explain the concept of an implicitly defined function, and use the technique of implicit differential on to differentiate functions that are defined implicitly. Model and solve related rates problems.</p>
<p>Students will be able to formulate and solve problems requiring the determination of related rates, and to use differentiation and other tests to solve problems requiring optimization.</p>	<p>Applications of the Derivative: Solve problems related to rates of change. Identify and describe properties of functions and their graphs. Apply the properties of functions and their graphs to real-life problem situations.</p>
<p>Students will be able to compute Riemann integrals from first principles, and by using the Fundamental theorems of the calculus, in a variety of simple applications.</p>	