Course Outcomes Guide (COG)

Course Title: **MAT 099 Elementary Algebra**   Date: June 2016

Course Team: **Rich Campbell, Lead Instructor for MAT 099,**
and other DEALS Math Faculty

Expected Learning Outcomes

Upon successful completion of this course students will be able to:

1. Simplify, model, and evaluate numerical and algebraic expressions in the real number system using the order of operations.

2. Find the area, circumference, and perimeter of simple and complex regions; convert within and between US and metric units of length, weight, capacity, time, and temperature.

3. Solve linear equations and inequalities in one variable, including application problems involving formulas, geometry, motion, percent, and mixtures.

4. Find the slope and the equation of a line, including application problems; model and graph linear equations and inequalities in two variables.

5. Model and solve systems of linear equations using graphing, substitution, and elimination methods.

6. Simplify exponential expressions with positive and negative exponents; convert between scientific and decimal notations; multiply and divide using scientific notation.

7. Recognize and factor polynomials; combine polynomials through addition, subtraction, multiplication, and division, including synthetic division.

8. Communicate and understand mathematical statements, ideas and results, with the correct use of mathematical definitions, terminology and symbolism.

Assessment: All MAT-099 Elementary Algebra students complete the same homework, quizzes, tests, and final exam. We use MyMathLab to run the course and all instructors are using the same assignments. All students take a forty five question final exam on paper. We have eight outcomes which are measured on the final exam. All of the final exam questions fit into one of the outcome categories, so each question is part of an outcome.

Validation: We use a rubric to grade the forty five question final exam where each question is worth 2-points (see attachment 1). The course was redesigned in 14/FA with these outcomes, but another redesign will be unveiled in 16/FA. Some of the outcomes will change with this new redesign since a few of the topics will change. For AY15-16, we did not have any external validation for our assessment.

Results: Students' assessment results and success rates have been analyzed.

1. Final Exam assessment scores were calculated by adding up all eight outcome scores and dividing by the total points possible (90).

2. Final Exam success is defined as a score of at least 63 out of 90 points (70%).

3. The data shows about a 3% decline in final exam scores from fall to spring semesters, but similar scores when comparing fall to fall or spring to spring: 14/FA (67.4%) to 15/FA (67.1%) and 15/SP (63.3%) to 16/SP (64.0%) (see attachment 5).

4. MAT 099 course success rates dropped slightly from 52.3% in 14/FA to 51.4% in 15/FA (0.9%) and increased from 41.2% in 15/SP to 46.3% in 16/SP (5.1%). The fall success rates appear to be higher than spring success rates every year (see attachment 3).

5. Students typically had success with the following outcomes: simplifying expressions, geometry/conversions, and slope of lines. Success rates for those outcomes were mostly near 70% or above for 14/FA through 16/SP.

6. Students typically did not have success with the following outcomes: Solving linear equations, word problems, systems of equations, factoring, and communicating an understanding of mathematical statements. Success rates for those outcomes were mostly near 60% or below for 14/FA through 16/SP.

Follow-up: All developmental mathematics courses were redesigned in 14/FA.

1. We changed the textbook for the developmental mathematics sequence and redesigned each course to incorporate more rigor. This may be evident due to the drop in success rates for MAT 099 starting in 14/FA.

2. There will be another redesign in 16/FA. The textbook will remain the same, but some of the topics will be rearranged. Factoring, graphing lines, slope, and systems of equations will be moved from MAT 099 to MAT 100. This may free up more time for instructors to cover the material with more depth. In turn, course success may increase.

3. The new SLOA (starting in 14/FA) measures eight outcomes and every question on the final exam fits into one of the eight categories. The table in the Results section specifies all eight outcomes, which final exam questions match those outcomes, as well as student success for those outcomes for each semester. We are still using this assessment and will not attach it to this COG for security reasons since this document will be posted on the HCC website.

4. Students were expected to have at least a 60% final exam score AND at least a 70% overall course grade in order to move on to MAT 100, i.e., pass MAT 099. In rare occasions where the student only met one of those criteria, a portfolio of the student's work was evaluated by the DEALS math team. After the portfolio review, the team recommended a C, D, or F grade for the student.

5. The redesign in 16/FA should address the outcomes that have low success rates by giving students more time to digest that material. We will rearrange content for MAT 098, 099, and 100 courses. External validation for our outcomes needs to be explored.

6. It appears that the latest redesign yields about a 21% walk-away F rate from 14/FA through 16/SP. One in five students leave the course and do not take the final exam, which seems like a lot of students. Perhaps with the redesign and the proposed student advising changes, student retention will increase.

Budget Justification: No additional funding/resources are needed at this time.

Attachments:
1. Developmental Mathematics Grading Rubric
2. MAT 099 Grade Distribution
3. MAT 099 SLOA Report 15/FA
4. MAT 099 SLOA Report 16/SP
5. MAT 099 SLOA Summary

Grading Rubric for Developmental Mathematics

General scale used for all Tests and Final Exams in MAT 098, MAT 099, and MAT 100

Percentage of Point Value	Description	
	Computational Questions	*Essay Questions*
100%	The student has the problem worked out completely, showing all the proper steps, and has the correct answer.	Answer must meet the criterion listed to the left AND must also be in complete sentences and use correct mathematical terminology and symbolism
90%	The student has worked out the problem using the correct mathematical procedure, but has made one minor mathematical (arithmetical) mistake giving the incorrect answer (unless the problem is testing one of these concepts, as oft is the case in MAT 098).	The criterion to the left is to be used.
75%	The student has used the correct mathematical procedure, but has several minor arithmetical errors or has one more major mathematical error in the problem.	The theme of the answer is correct, but has a minor error in mathematical terminology or symbolism OR the answer is not grammatically correct.
50%	The student has started the problem using the correct mathematical procedure, but has several mathematical errors and weak justification for the work.	The theme of the answer is correct but there is major mistake in mathematical terminology or symbolism.
25%	The student response demonstrates understanding of at least one major concept, however, it is mostly incorrect. Justifications may be missing or may lack clear mathematical reasoning. Only the correct answer is given without any supporting work.	The criterion to the left is to be used.
0	The student response in incorrect and lacks reasonable justification. The student did not respond to this problem.	The criterion to the left is to be used.

MAT 099 Grade Distribution – 15/FA

MAT-099	15/FA								
	Total	A	B	C	D	F	WF	W/I/AU	Success	Completer Success
Lecture 12	45	2.2% (n=1)	4.4% (n=2)	15.6% (n=7)	0.0% (n=0)	73.3% (n=33)	53.3% (n=24)	4.4% (n=2)	22.2% (n=10)	52.6%
Lecture 15 week	236	5.5% (n=13)	12.3% (n=29)	25.0% (n=59)	3.0% (n=7)	48.7% (n=115)	23.7% (n=56)	5.5% (n=13)	42.8% (n=101)	60.5%
Lecture Subtotal	*281*	*5.0% (n=14)*	*11.0% (n=31)*	*23.5% (n=66)*	*2.5% (n=7)*	*52.7% (n=148)*	*28.5% (n=80)*	*5.3% (n=15)*	*39.5% (n=111)*	*59.7%*
Package Hybrid	49	14.3% (n=7)	22.4% (n=11)	36.7% (n=18)	0.0% (n=0)	22.4% (n=11)	16.3% (n=8)	4.1% (n=2)	73.5% (n=36)	92.3%
Package Lecture	158	21.5% (n=34)	29.1% (n=46)	19.0% (n=30)	1.9% (n=3)	24.1% (n=38)	5.7% (n=9)	4.4% (n=7)	69.6% (n=110)	77.5%
Package Web	23	21.7% (n=5)	13.0% (n=3)	8.7% (n=2)	13.0% (n=3)	34.8% (n=8)	30.4% (n=7)	8.7% (n=2)	43.5% (n=10)	71.4%
Package Subtotal	*230*	*20.0% (n=46)*	*26.1% (n=60)*	*21.7% (n=50)*	*2.6% (n=6)*	*24.8% (n=57)*	*10.4% (n=24)*	*4.8% (n=11)*	*67.8% (n=156)*	*80.0%*
Web 15 week	26	11.5% (n=3)	7.7% (n=2)	15.4% (n=4)	0.0% (n=0)	57.7% (n=15)	38.5% (n=10)	7.7% (n=2)	34.6% (n=9)	64.3%
Web Subtotal	*26*	*11.5% (n=3)*	*7.7% (n=2)*	*15.4% (n=4)*	*0.0% (n=0)*	*57.7% (n=15)*	*38.5% (n=10)*	*7.7% (n=2)*	*34.6% (n=9)*	*64.3%*
15/FA Subtotal	**537**	**11.7% (n=63)**	**17.3% (n=93)**	**22.3% (n=120)**	**2.4% (n=13)**	**41.0% (n=220)**	**21.2% (n=114)**	**5.2% (n=28)**	**51.4% (n=276)**	**69.9%**

Full-Time Faculty vs Adjunct Faculty

	Total	A	B	C	D	F	WF	W/I/AU	Success	Completer Success
Full-time	162	21.0% (n=34)	19.1% (n=31)	24.1% (n=39)	5.6% (n=9)	25.3% (n=41)	12.3% (n=20)	4.9% (n=8)	64.2% (n=104)	77.6%
Adjunct	375	7.7% (n=29)	16.5% (n=62)	21.6% (n=81)	1.1% (n=4)	47.7% (n=179)	25.1% (n=94)	5.3% (n=20)	45.9% (n=172)	65.9%

MAT 099 Grade Distribution – 16/SP

	Total	A	B	C	D	F	WF	W/I/AU	Success	Completer Success
MAT-099				**16/SP**						
Lecture 12	29	10.3% (n=3)	3.4% (n=1)	24.1% (n=7)	0.0% (n=0)	51.7% (n=15)	31.0% (n=9)	10.3% (n=3)	37.9% (n=11)	64.7%
Lecture 15 week	160	5.6% (n=9)	11.3% (n=18)	18.8% (n=30)	8.8% (n=14)	50.6% (n=81)	26.9% (n=43)	5.0% (n=8)	35.6% (n=57)	52.3%
Lecture Subtotal	*189*	*6.3% (n=12)*	*10.1% (n=19)*	*19.6% (n=37)*	*7.4% (n=14)*	*50.8% (n=96)*	*27.5% (n=52)*	*5.8% (n=11)*	*36.0% (n=68)*	*54.0%*
Package Lecture	96	16.7% (n=16)	27.1% (n=26)	21.9% (n=21)	4.2% (n=4)	24.0% (n=23)	12.5% (n=12)	6.3% (n=6)	65.6% (n=63)	80.8%
Package Web	26	26.9% (n=7)	19.2% (n=5)	3.8% (n=1)	0.0% (n=0)	38.5% (n=10)	30.8% (n=8)	11.5% (n=3)	50.0% (n=13)	86.7%
Package Subtotal	*122*	*18.9% (n=23)*	*25.4% (n=31)*	*18.0% (n=22)*	*3.3% (n=4)*	*27.0% (n=33)*	*16.4% (n=20)*	*7.4% (n=9)*	*62.3% (n=76)*	*81.7%*
Web 15 week	25	12.0% (n=3)	8.0% (n=2)	24.0% (n=6)	16.0% (n=4)	24.0% (n=6)	24.0% (n=6)	16.0% (n=4)	44.0% (n=11)	73.3%
Web Subtotal	*25*	*12.0% (n=3)*	*8.0% (n=2)*	*24.0% (n=6)*	*16.0% (n=4)*	*24.0% (n=6)*	*24.0% (n=6)*	*16.0% (n=4)*	*44.0% (n=11)*	*73.3%*
16/SP Subtotal	**336**	**11.3% (n=38)**	**15.5% (n=52)**	**19.3% (n=65)**	**6.5% (n=22)**	**40.2% (n=135)**	**23.2% (n=78)**	**7.1% (n=24)**	**46.1% (n=155)**	**66.2%**

Full-Time Faculty vs Adjunct Faculty

	Total	A	B	C	D	F	WF	W/I/AU	Success	Completer Success
Full-time	132	9.1% (n=12)	12.1% (n=16)	21.2% (n=28)	15.2% (n=20)	32.6% (n=43)	24.2% (n=32)	9.8% (n=13)	42.4% (n=56)	64.4%
Adjunct	204	12.7% (n=26)	17.6% (n=36)	18.1% (n=37)	1.0% (n=2)	45.1% (n=92)	22.5% (n=46)	5.4% (n=11)	48.5% (n=99)	67.3%

MAT-099 SLOA Report

Lead Faculty: Rich Campbell

Term	# of Students	Course Results				Common Assessments				
		Success	Walk-Away F	With-drawal	Mean GPA	PreTest Avg	PostTest Avg	Avg Change	Course	GenEd
12/SP	n = 422	60.0% n = 253	16.6% n = 70	5.9% n = 25	1.89	N/A out of 10	N/A out of 10	N/A	----	N/A
12/SU	n = 161	69.6% n = 112	11.2% n = 18	5.0% n = 8	2.29	1.47 out of 10	6.87 out of 10	5.21	----	N/A
12/FA	n = 719	61.6% n = 443	18.5% n = 133	5.1% n = 37	1.92	1.29 out of 10	6.38 out of 10	5.00	----	N/A
13/SP	n = 414	57.7% n = 239	20.0% n = 83	5.8% n = 24	1.76	1.29 out of 10	6.13 out of 10	4.83	----	N/A
13/SU	n = 182	59.9% n = 109	0.0% n = 0	7.1% n = 13	1.99	1.93 out of 10	6.85 out of 10	4.89	----	N/A
13/FA	n = 620	64.7% n = 401	14.4% n = 89	5.5% n = 34	2.07	1.51 out of 10	6.42 out of 10	4.89	4.46 out of 6	N/A
14/SP	n = 339	55.5% n = 188	22.1% n = 75	6.8% n = 23	1.79	1.50 out of 10	5.92 out of 10	4.53	4.29 out of 6	N/A
14/SU	n = 151	62.3% n = 94	14.6% n = 22	6.6% n = 10	2.04	1.31 out of 10	6.41 out of 10	5.09	4.20 out of 6	N/A
14/FA	n = 533	52.3% n = 279	21.4% n = 114	7.9% n = 42	1.60	N/A	N/A	N/A	60.66 out of 90	N/A
15/SP	n = 354	41.2% n = 146	22.0% n = 78	12.1% n = 43	1.36	N/A	N/A	N/A	56.95 out of 90	N/A
15/SU	n = 109	58.7% n = 64	20.2% n = 22	8.3% n = 9	1.93	N/A	N/A	N/A	65.91 out of 90	N/A
15/FA	n = 537	51.4% n = 276	21.0% n = 113	4.8% n = 26	1.53	N/A	N/A	N/A	60.37 out of 90	N/A
16/SP	n = 336	46.1% n = 155	21.1% n = 71	7.7% n = 26	1.48	N/A	N/A	N/A	57.59 out of 90	N/A

MAT 099 SLOA Summary

FA14	FA15	SP15	SP16	Questions		Outcome being measured
82.3%	84.1%	80.7%	84.5%	1-4	1	Simplify, model, and evaluate numerical and algebraic expressions in the real number system using the order of operations.
78.6%	76.9%	75.2%	73.8%	5-12	2	Find the area, circumference, and perimeter of simple and complex regions; convert within and between US and metric units of length, weight, capacity, time, and temperature.
66.9%	63.3%	61.8%	66.0%	13-21	3	Solve linear equations and inequalities in one variable, including application problems involving formulas, geometry, motion, percent, and mixtures.
74.8%	74.6%	68.9%	70.8%	22-25	4	Find the slope and the equation of a line, including application problems; model and graph linear equations and inequalities in two variables.
52.5%	49.8%	46.4%	49.2%	26-29	5	Model and solve systems of linear equations using graphing, substitution, and elimination methods.
74.5%	74.2%	70.2%	71.6%	30-34	6	Simplify exponential expressions with positive and negative exponents; convert between scientific and decimal notations; multiply and divide using scientific notation.
59.7%	59.4%	53.7%	50.4%	35-43	7	Recognize and factor polynomials; combine polynomials through addition, subtraction, multiplication, and division, including synthetic division.
55.4%	47.1%	35.4%	40.0%	44-45	8	Communicate and understand mathematical statements, ideas and results, with the correct use of mathematical definitions, terminology and symbolism.