

## Course Outcomes Guide (COG)

**Course Title:** MAT164 (3 Credits) CALCULUS W/APPLICATIONS

**Date:** 12/14/15

**Course Team:** Tom Crawford

### STUDENT LEARNING OUTCOMES:

#### General Education/Program/Course Outcomes:

##### Upon successful completion of this course, students will learn how to:

- G1. Apply mathematical methods involving arithmetic, algebra, geometry, and graphs to solve problems.
- G2. Represent mathematical information and communicate mathematical reasoning symbolically and verbally.
- G3. Interpret and analyze numerical data, mathematical concepts, and identify patterns to formulate and validate reasoning.
- P/C1. Use computational techniques and algebraic skills essential for success in an academic, personal, or workplace setting. (Computational and Algebraic Skills)
- P/C2. Use visualization, special reasoning, as well as geometric properties and strategies to model and solve problems. (Geometric Skills)
- P/C3. Collect, organize, and display data as well as use appropriate statistical methods to analyze data and make inferences and predictions. (Statistical Skills)
- P/C4. Critically analyze and construct mathematical arguments. (Proof and Reasoning)
- P/C5. Use technology, where appropriate, to enhance and facilitate mathematical understanding, as well as an aid in solving problems and presenting solutions. (Technological Skills)
- P/C6. Communicate and Understand mathematical statements, ideas and results, both verbally and in writing, with the correct use of mathematical definitions, terminology and symbolism. (Communication Skills)
- P/C7. Work collaboratively with peers and instructors to acquire mathematical understanding and to formulate and solve problems and present solutions. (Collaborative Skills)

#### Assessment:

1. A common assessment (comprehensive final exam) for this course has been in place since SP2010 semester and data has been collected.
2. All historical data has been uploaded into the “Mathy” database.
3. The common assessment (CA) consists of a small number of skills questions and several application problems on a continuum of depth/breath.
4. All application questions are consistent with class examples and semester exam questions.

#### Validation:

1. CA results are evaluated only after final course grades are assigned by the instructor.
2. Correlation between students’ course average and CA composite score is evaluated each semester.
3. CA question results that differ dramatically from historical values will establish content areas in need of corrective action and those where previous efforts to affect improvement have been successful.

**Results:**

1. Historical course averages are well correlated ( $\alpha = .01$ ,  $n=106$ , and  $r=.69$ ) with CA results. FA14/SP15 course averages are well correlated ( $\alpha = .01$ ,  $n=13$ , and  $r=.7$ ) with CA results.
2. FA14 Strength/Weakness: Item 7 (Integration Application)/Item 4 (Cost Minimization)
3. SP15 Strength/Weakness: None/Most
4. Historical CA Strengths: Items 1 (Derivatives) and 2 (Integrals)
5. Historical CA Weaknesses: Item 4 (Cost Minimization)
6. Mean scores earned on the CA were compared based on delivery method. There was not a statistically significant ( $\alpha = 0.1$ ) difference between Lecture, Hybrid, or Web when compared to the mean of all delivery methods. When comparing one delivery method vs. another, however, there was one statistically significant difference uncovered. The mean CA score earned by Lecture students is higher than that earned by Web students.

**Follow-up:**

1. None
2. Item 7 was covered extensively during the Final Exam Review. Item 4 is a consistent weakness; see #5 below for follow-up plan.
3. As a group the level of advanced preparation for this course was exceptionally poor. Much time was spent on simplifying fractions, factoring, graphing lines & functions, slope, etc. Results for this class were lower than overall course averages for nearly all CA items. This class data will not be used to alter this course content or delivery. A pre-assessment will be instituted to determine, in an objective way, the level of advanced preparation attained by incoming students.
4. Strengths are skills type questions and emphasis will continue.
5. Most errors are occurring early in the modeling process. Classwork emphasizing this process will be introduced.
6. This course was most recently delivered in a Web format in Fall 13. There are no plans to offer a Web section in the near future.

**Budget Justification:**

1. No funding is required at this time for this course.

**Course: MAT 164**

**Lead Faculty: T. Crawford**

	FA10	SP11	SU11	FA11	SP12	SU12	SP13	FA13	SP14	FA14	SP15
# Active students	13	15	9	17	21	9	16	8	12	9	10
# Withdraw % Withdraw	15.4%	33.3%	11.1%	5.9%	23.8%		2 13%	1 12.5%	1 8.3%	2 22.2%	2 20%
# Walkaway Fs % Walk-Away Fs*						33.3%	3 19%	0 0%	2 16.7%	1 11.1%	1 10%
# Success (A,B,C) % Success (A,B,C)	76.9%	46.7%	87.5%	82.4%	61.9%	66.7%	9 57%	7 87.5%	8 66.7%	5 55.6%	5 50%
Gen Ed SLOA	N/A	N/A	N/A	N/A	N/A	N/A	79%	N/A	82%	73%	67%
Course SLOA	71.5%	56%	57%	60.4%	42%	65%	56%	57%	56%	54%	43%
SLOA Item Analysis							S-1,2 W-3	S-7 W-4	S-2 W-5	S-7 W-4	S-2 W-3
Mean Course Grade	2.91	2.40	2.57	2.81	2.38	2.0	2.21	3.29	2.27	2.29	2.38

\*Did not take the final exam and received a grade of F.

## MAT164 COURSE SLOA RESULTS

	Format	Course SLOA	Q1	Q2	Q3	Q4	Q5	Q6	Q7
SP10	Lec	26.07 65.2%	0.74	0.81	0.46	0.20	0.57	0.43	0.80
FA10	Lec	28.6 71.5%	0.80	0.84	0.46	0.34	0.44	0.72	0.84
SP11	Web	22.56 56%	0.74	0.64	0.48	0.31	0.26	0.45	0.48
SU11	Web	22.75 57%	0.65	0.74	0.43	0.00	0.10	0.90	0.67
FA11	Lec	24.16 60.4%	0.61	0.52	0.61	0.44	0.73	0.46	0.51
SP12	Web	16.86 42%	0.48	0.44	0.33	0.26	0.44	0.26	0.41
SU12	Hyb	25.92 65%	0.75	0.75	0.70	0.07	0.38	0.63	0.70
SP13	Lec	22.23 56%	0.70	0.60	0.45	0.18	0.27	0.50	0.64
FA13	Web	22.71 57%	0.64	0.51	0.61	0.19	0.4	0.49	0.71
SP14	Hyb	22.44 56%	0.61	0.7	0.46	0.28	0.23	0.63	0.60
FA14	Hyb	23.42 54%	0.63	0.64	0.47	0.23	0.37	0.53	0.8
SP15	Hyb	18.57 43%	0.48	0.61	0.27	0.29	0.43	0.46	0.39
Overall	All	22.8 57%	0.64	0.63	0.48	0.26	0.42	0.51	0.61

Mean Lec = 25.27 =  
63.2%

Mean Hyb = 22.43 =  
56.1%

Mean Web = 21.22 =  
53.1%