Course Outcomes Guide (COG)

Course Title: **MAT109 (3 Credits) INRO TO STATS**

Date: **6/8/18**

Course Team: **Tom Crawford, Joseph Mason, Richard Campbell, Alicia Myers, Steve Lindsey**

STUDENT LEARNING OUTCOMES:

General Education: Upon successful completion of this course, students will have demonstrated the capacity to effectively…

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.

Course: Upon successful completion of this course, students will have demonstrated Statistical Literacy (SL) and Statistical Reasoning (SR).

SL - Statistical literacy involves understanding and using the basic language and tools of statistics: knowing what statistical terms mean, understanding the use of statistical symbols, and recognizing and being able to interpret representations of data.

SR - Statistical reasoning is the way people reason with statistical ideas and make sense of statistical information. Statistical reasoning may involve connecting one concept to another (e.g., center and spread) or may combine ideas about data and chance. Reasoning means understanding and being able to explain statistical processes, and being able to fully interpret statistical results.

These skills/abilities will be applied to the follow course concepts generating 26 distinct course outcomes: SL1, SR1, SL2, SR2, ..., SR13, SR13.

1 – Data Collection
2 – Summarizing Data Graphically
3 – Summarizing Data Numerically
4 – Regression
5 – Probability
6 – Discrete Distributions
7 – Normal Distributions
8 – Sampling Distributions
9 – Parameter Estimation
10 – One Sample Inference
11 – Two Sample Inference
12 – Chi-Square Tests
13 – ANOVA

Assessment:

1. Up until Fall 2017 a common assessment (CA) was delivered to all students across all sections and delivery modes. This common tool was first used at the conclusion of the Fall 2012 semester and remains in place for dual enrolled students in the HS AP classroom.
2. This CA consists of 19 MC questions selected from AP Stats and Praxis Exams.
3. The assessment was/continues to be delivered in the classroom or Academic Testing Center at the conclusion of the course.
4. Beginning Spring 2018 the revised course final exam became the new CA for on campus and online sections.

Validation:

1. All pre-SP18 assessment data has been entered into the "Mathy" database.
2. CA results have been evaluated only after final course grades were assigned by the instructor.
3. Correlation between students' course grade and composite CA scores have been determined annually.
4. Grade distribution and mean CA score by letter grade are compared on campus vs HS dual enrollment offerings.
5. CA question results that differed significantly (alpha = .05) from HCC historical values determined content areas in need of corrective action and those where previous efforts had proven un/successful.
6. CA question results that differed significantly (alpha = .05) from nationally normed exam results determined content areas to be studied for systemic strength or weakness.

Results:

1. A simple linear correlation between CA results and student letter grades has been present.
2. A simple linear correlation between CA results and final exam score has been present.
3. Disparity between HS AP students and HCC students is pronounced when considering the proportion of letter grades earned. HS AP students have a much more right-skewed distribution. Similarly, HS AP students significantly outperform HCC students on CA items.
4. During SU17 and FA17 CA items showed practical, but not statistically significant, improvement.
5. Collective HCC results (16 semesters) compared to national results indicate the proportion of HCC students answering each CA question correctly has been significantly lower than the national proportion.

Follow-up:

1. Off campus sections of this course are offered in a strictly AP environment. A higher proportion of A and B grades is to be expected as the on campus students are not held to AP level entrance requirements. Similarly, higher scores on CA items is to be expected as the CA items are selected from AP and Praxis exams whereas the on campus sections do not rise to this level of rigor.
2. HCC results have been remarkably consistent. Effort to address specific weaknesses were not indicated. However, efforts to address overall weakness was strongly indicated.
3. This systemically week CA performance coupled with concerns regarding rigor from our transfer partners and WCPS necessitated the recent course revision.

Closing the Loop:

1. Major course revision emphasizing advanced student preparation, flipped classroom environment, and interactive learning was undertaken during SP17. Pilot sections were offered in SU17. The new format was in place for all online, hybrid, and on-campus lecture sections in FA17.
2. CA comparison of historical averages to SU17 and FA17 results indicated practical, but not statistically significant, improvement.
3. The new CA for the revised course is the course mid-term and final exam.
4. Mid-term and Final Exam data from FA17 and SP18 are available. Although, question pooling is making automated data analysis problematic.

5. Lead instructor will work with Rebecca Kendrick to utilize the Mathy database to improve new CA data input, processing, and output.
6. Alternatively, a different CA will be designed/selected.

Around the Corner:

1. A new mathematics course is being developed to address the needs of those students requiring general studies math credit but not needing any additional mathematics for their program, transfer, or career intentions. This new course could take many forms at this point, but one thing is certain. This new course drawing off many students from MAT101 (College Algebra) and MAT109 (Statistics) will allow these courses to be revised upward for content and rigor to be more consistent with our transfer institution partners.

Budget Justification:

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

Course: MAT 109 **Lead Faculty: T. Crawford**

	SU 2013	FA 2013	SP 2014	SU 2014	FA 2014	SP 2015	SU 2015	FA 2015	SP 2016	SU 2016	FA 2016	SP 2017	SU 2017	FA 2017	SP 2018
# Active students	106	173	221	120	214	234	90	225	212	94	267	236	51	244	178
# Withdraw % Withdraw	8 7.5%	16 9.2%	25 11.3%	16 13.3%	22 10.3%	23 9.8%	13 14.4%	19 8.4%	19 9.0%	10 10.6%	26 9.7%	14 5.9%	7 13.7%	33 13.5%	18 10.1%
# Walk-Away Fs* % Walk-Away Fs*	0 0%	15 8.7%	29 13.1%	9 7.5%	24 11.2%	25 10.7%	0 0.0%	19 8.4%	29 13.7%	3 3.2%	25 9.4%	25 10.6%	10 19.6%	10 4.1%	23 12.9%
# Success (A,B,C) % Success (A,B,C)	87 82.1%	120 69.4%	152 68.8%	85 70.8%	125 58.4%	136 58.1%	69 76.7%	157 69.8%	139 65.6%	69 73.4%	188 70.4%	153 64.8%	29 56.9%	143 58.6%	95 53.4%
Gen Ed SLOA	N/A	64.6%	63.3%	66.1%	64.4%	66.0%	N/A	64.9%	63.8%	62.0%	61.8%	59.0%	59%	63.5%	60.3%
Course SLOA	41.8%	43.8%	41.8%	43.3%	43.4%	43.1%	N/A	43.8%	42.5%	39.1%	42.2%	42.9%	43.1%	46.7%	61.2%
SLOA Item Analysis	S - 16	No Sig. Items	No Sig. Items	No Sig. Items	W - 12	No Sig. Items	N/A	No Sig. Items	No Sig. Items	No Sig. Items	No Sig. Items	No Sig. Items	Overall Imp.	Overall Imp. & New CA	New CA
Mean Course Grade	2.82	2.29	2.10	2.55	2.14	1.96	2.66	2.41	2.38	2.69	2.40	2.15	2.05	2.07	1.79

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