Assessment: Course Four Column

SPRING / SUMMER 2016

El Camino: Course SLOs (MATH) - Math (Prospective Elementary School Teachers)

ECC: MATH 115:Probability and Statistics for Prospective Elementary School Teachers

Course SLOs	*Assessment Method Description*	*Results*	*Actions*
SLO #1 Research Study - Students will be able to design a research study, develop an appropriate assessment instrument, collect and analyze data using appropriate methods, and draw statistical inferences from the data in written form. **Course SLO Status:** Active **Course SLO Assessment Cycle:** 2013-14 (Spring 2014), 2014-15 (Spring 2015), 2015-16 (Spring 2016), 2016-17 (Spring 2017) **Input Date:** 11/21/2013	**Laboratory Project/Report -** To assess this SLO, students complete a statistics research study. The rubric will be offered in the Standard and Target for Success section. **Standard and Target for Success:** Standard for Success: 70% of the students will receive a grade of A, B or C on the statistics research study project. STATISTICS RESEACH STUDY EVALUATION FORM Part One: The Design of the Research Study (3 points possible) Design presented with no errors, well-written, and complete. (3 points) Design presented with a few errors, errors in the writing, and/or missing a few components. (2 points) Design presented with several errors, errors in the writing, and/or missing some important components. (1 point)		

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	Design presented is substantially flawed. (0 points) Points Earned for Part One: _____ Part Two: Data Analysis (3 points possible) Raw data and data analysis is presented with no errors, well-written, and complete. (3 points) Raw data and data analysis presented with a few errors, errors in the writing, and/or missing a few components. (2 points) Raw data and data analysis presented with several errors, errors in the writing, and/or missing some important components. (1 point) Raw data is missing. (0 points) Data analysis is substantially flawed. (0 points) Points Earned for Part Two: _____ Part Three: Statistical Inferences (3 points possible) Statistical inferences, observations, and recommendations are stated clearly with no errors, well-written, and complete. (3 points) Statistical inferences, observations, and recommendations are stated with a few errors, errors in the writing, and/or missing at least one component. (2 po		
	Project - The semester long statistics	**Semester and Year Assessment Conducted:** 2015-16	**Action:** In addition to examining

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	research study project will be used to assess SLO #1. **Standard and Target for Success:** Standard for Success: 70% ASSESSMENT RUBRIC Score of 4: • Students are able to design a research study, develop appropriate assessment instruments, collect and analyze data, draw statistical inferences, and write the information in an exemplary fashion. Score of 3: • Students are able to design a research study, develop appropriate assessment instruments, collect and analyze data, draw statistical inferences, and write the information in a competent fashion. Score of 2: • Students are able to design a research study, develop appropriate assessment instruments, collect and analyze data, draw statistical inferences, and write the information in an adequate fashion. Score of 1: • Students are unable to design a research study, develop appropriate assessment instruments, collect and analyze data, draw statistical inferences, and write the information.	(Spring 2016) **Standard Met? :** Standard Met RESULTS Mean = 3.39 Standard Deviation = 0.95 Pearson Correlation Coefficient: -.22 Correlation Conclusion: There is no correlation between number of absences and SLO #1. Average Number of Absences: 3.33 Sample Size: 18 The mean and standard deviation of the data for SLO #1 have remained consistent over time. The data indicates that as a collective group, students are competent in designing a research study, collecting and analyzing data, drawing inferences from the data analysis, and reflecting on their work. The Pearson Correlation Coefficient indicates that there is no correlation between the number of absences and student performance on SLO #1. We have found this trend over the past several years and still contend that student attendance plays some role in the attainment of this learning outcome. (05/04/2016) **Faculty Assessment Leader:** Judy Kasabian **Faculty Contributing to Assessment:** Judy Kasabian	Math 115 students' performance on a statistical research study, the Mathematics for Teachers committee will continue to collect data about the impact of student attendance on SLO performance. This year and in subsequent years the average number of student absences will be computed to see if this information remains steady or changes over time. (05/04/2017) **Action Category:** Teaching Strategies **Follow-Up:** Data collected during the Spring 2017 semester for SLO #1 indicates that the target for success has once again been met. (05/19/2017)
SLO #2 Analyze Statistical Procedure - Given a particular set of data,	**Multiple Assessments -** Two forms of assessments will be used to assess		

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students will be able to determine the appropriate statistical procedures to analyze and display the data, complete the statistical methods, and explain the mathematical concepts in written and oral forms. **Course SLO Status:** Active **Course SLO Assessment Cycle:** 2013-14 (Spring 2014), 2014-15 (Spring 2015), 2015-16 (Spring 2016), 2016-17 (Spring 2017) **Input Date:** 11/21/2013	this SLO. First, the scores for the visual and mathematical statistics exam will be used; and second, the scores for Part II of the statistics research study project will be used. **Standard and Target for Success:** Standard for Success: 70% of the students will earn a grade of A, B, or C on the visual and mathematical statistics test and 70% of the students will score a 2 or 3 on Part II of the Statistics Research Study Project. VISUAL AND MATHEMATICAL STATISTICS EXAM (50 points possible) Scores of 45- 50: A Scores of 40-44: B Scores of 33-39: C Scores of 28-32: D Scores of 27 and below: F PART II – STATISTICS RESEARCH STUDY Raw data and data analysis is presented with no errors, well-written, and complete. (3 points) Raw data and data analysis presented with a few errors, errors in the writing, and/or missing a few components. (2 points) Raw data and data analysis presented with several errors, errors in the writing, and/or missing some important components. (1 point) Raw data is missing. (0 points) Data analysis is substantially flawed. (0 points)		

Course SLOs	Assessment Method Description	Results	Actions
	Reviewer's Comments: No additional comments **Exam/Test/Quiz -** Two forms of assessment are used to determine the extent to which this SLO has been met. The first assessment is the test given covering visual and mathematical statistics. The second assessment is the data analysis portion of the statistics research study. **Standard and Target for Success:** Standard for Success: 70% ASSESSMENT RUBRIC Score of 4: • Students demonstrate a keen understanding of how to select appropriate statistical procedures to analyze and display data. • Students are able to provide an exemplary explanation of how to select appropriate statistical procedures in written and oral means. Score of 3: • Students demonstrate a good understanding of how to select appropriate statistical procedures to analyze and display data. • Students are able to provide a competent explanation of how to select appropriate statistical procedures in written and oral means. Score of 2: • Students demonstrate a fair understanding of how to select appropriate statistical procedures to analyze and display data. • Students are able to	**Semester and Year Assessment Conducted:** 2015-16 (Spring 2016) **Standard Met? :** Standard Not Met RESULTS Mean = 2.55 Standard Deviation = 1.07 Pearson Correlation Coefficient: -0.26 Correlation Conclusion: There is no correlation between the number of absences and SLO #2. Average Number of Absences: 3.33 Sample Size: 18 The mean and standard deviation of the data for SLO #2 is lower this semester than in years past. The data indicates that as a collective group, students are somewhat competent in determining an appropriate data analysis procedure to use given a research question and data set and correctly interpret the analysis by making appropriate statistical inferences. The Pearson Correlation Coefficient indicates that there is no correlation between the number of absences and student performance on SLO #2. We have found this trend over the past several years and we observe that even though there is no statistical correlation, student attendance does impact student understanding and their abilities to select a relevant statistical procedure and analyze and interpret the data, and make conclusions about the findings. (05/04/2016) **Faculty Assessment Leader:** Judy Kasabian **Faculty Contributing to Assessment:** Judy Kasabian	**Action:** Given that the target for success was not met for SLO #2, data will be collected annually to determine if this is an anomaly result or a trend that needs to be examined more closely. In addition to examining Math 115 students' success in determining and using appropriate data analysis procedures, the Mathematics for Teachers committee will continue to collect data about the impact of student attendance on SLO performance. This year and in subsequent years the average number of student absences will be computed to see if this information remains steady or changes over time. (05/04/2017) **Action Category:** Teaching Strategies

Course SLOs	Assessment Method Description	Results	Actions
	provide an adequate explanation of how to select appropriate statistical procedures in written and oral means. Score of 1: • Students are unable to demonstrate how to select appropriate statistical procedures to analyze and display data. • Students are unable to provide an explanation of how to select appropriate statistical procedures in written and oral means.		
SLO #3 Explain Statistics and Probability Concepts - Given a particular set of data, students will be able to explain statistics and probability concepts and use appropriate methodologies for elementary or middle school teachers. **Course SLO Status:** Active **Course SLO Assessment Cycle:** 2013-14 (Spring 2014), 2014-15 (Spring 2015), 2015-16 (Spring 2016), 2016-17 (Spring 2017) **Input Date:** 11/21/2013	**Exam/Test/Quiz -** To assess this SLO, exam questions asking students to explain concepts in probability and statistics will be used. For Statistics and Probability, the following questions were used. 1. Explain the steps in the p-value approach in hypothesis testing. 2. Explain the differences between an experimental study and an observational study. 3. Explain the differences between a retrospective observational study and a prospective observational study. 4. Explain the differences between a single blind experiment and a double blind experiment. 5. What types of sampling methods are inherently biased? Explain why this is so?	**Semester and Year Assessment Conducted:** 2015-16 (Spring 2016) **Standard Met? :** Standard Met RESULTS Mean = 3.22 Standard Deviation = 0.85 Pearson Correlation Coefficient: -0.24 Correlation Conclusion: There is no correlation between the number of absences and SLO #3. Average Number of Absences: 3.33 Sample Size: 18 Analysis and Results: The mean and standard deviation of the data for SLO #3 have remained consistent over time. The data indicates that as a collective group, students are competent in explaining concepts and procedures in statistics and probability in written and oral forms. We contend that this is a result of students completing some or all of the Math for Teachers course sequence (Math 110, Math 115, Math 116) where explanations of conceptual and procedural understanding is consistently discussed and student practice these explanations many times during the semester and are tested on them using a variety of	**Action:** In addition to examining the conceptual and procedural understanding of students in Math 115, the Mathematics for Teachers committee will continue to collect data about the impact of student attendance on SLO performance. This year and in subsequent years the average number of student absences will be computed to see if this information remains steady or changes over time. (05/04/2017) **Action Category:** Teaching Strategies

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	6. What does it mean to BIASED for statistics? 7. Explain the four scenarios in HYPOTHESIS TESTING. 8. If the student scores in the 74th percentile in math computation, explain how this score is interpreted. 9. If the student scores in the 51st percentile in mathematical understanding of concepts, explain how this score is interpreted. 10. Why are thousands and thousands of data points essential to determine a percentile score? 11. The Pearson Correlation Coefficient for a particular piece of data is -.63. What type of correlation does this data have? Explain how you determined the type of correlation. 12. Explain what the mean (average) of a set of data aims to do and how the standard deviation impacts what the mean attempts to do? 13. Explain the differences between a percent score and a percentile score. 14. Explain the differences between an "average" and a "weighted average"? 15. In a multi-staged event, the mathematical probability is determined by the product of the fractions for each stage of the event. For example, in an experiment with three stages, the mathematical probability will have a fraction representing the likelihood of each	assessment instruments. The Pearson Correlation Coefficient indicates that there is no correlation between the number of absences and student performance on SLO #2. We have found this trend over the past several years; however, we contend that since explanations of conceptual ideas and procedural strategies become stronger with time and practice, student attendance does play a part in the attainment of SLO #3. (05/04/2016) **Faculty Assessment Leader:** Judy Kasabian **Faculty Contributing to Assessment:** Judy Kasabian	

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	stage of the experiment. To determine the mathematical probability, we would multiply the fractions together. Explain fully why multiplication is used. 16. Explain why the mathematical probability of an event must be between 0 and 1. **Standard and Target for Success:** Standard for Success: 70% of the students will earn a rubric score of 3 or 4. The following rubric will be used to assess this SLO. Score of 4: Students are able to explain statistical and probability concepts and use appropriate methodologies for K-8 students in an exemplary fashion. Score of 3: Students are able to explain statistical and probability concepts and use appropriate methodologies for K-8 students in a competent fashion. Score of 2: Students are able to explain statistical and probability concepts and use appropriate methodologies for K-8 students in an adequate fashion. Score of 1: Students are unable to explain statistical and probability concepts and use appropriate methodologies for K-8 students in an exemplary fashion.		

Course SLOs	Assessment Method Description	Results	Actions

Reviewer's Comments: No additional comments.
Exam/Test/Quiz - Three forms of assessment will be used to determine the extent to which SLO #3 has been met. The first assessment is an exam covering hypothesis testing, sampling, and types of studies. The second assessment is an exam covering visual and mathematical statistics. The third assessment is the discussions and group work students participate in during class time.
Standard and Target for Success:
Standard for Success: 70%

ASSESSMENT RUBRIC
Score of 4:
- Students are able to explain statistical and probability concepts and use appropriate methodologies for K-8 students in an exemplary fashion.

Score of 3:
- Students are able to explain statistical and probability concepts and use appropriate methodologies for K-8 students in a competent fashion.

Score of 2:
- Students are able to explain statistical and probability concepts and use appropriate methodologies for K-8 students in an adequate fashion.

Score of 1:
- Students are unable to

Course SLOs	Assessment Method Description	Results	Actions
	explain statistical and probability concepts and use appropriate methodologies for K-8 students in an exemplary fashion.		
SLO #4 Solve and Interpret Experimental and Mathematical Probability - Students will be able to solve, explain, and interpret informal, experimental, and mathematical probability concepts and application problems both in written and oral forms. **Course SLO Status:** Active **Course SLO Assessment Cycle:** 2013-14 (Spring 2014), 2014-15 (Spring 2015), 2015-16 (Spring 2016), 2016-17 (Spring 2017) **Input Date:** 11/21/2013	**Exam/Test/Quiz -** To assess this SLO, scores on the probability exam will be used. **Standard and Target for Success:** Standard for Success: 70% of the students will earn a grade of A, B or C. PROBABILITY EXAM (50 points possible) Scores of 45- 50: A Scores of 40-44: B Scores of 34-39: C Scores of 30-33: D Scores of 29 and below: F **Reviewer's Comments:** No Additional Comments		
	Exam/Test/Quiz - The assessment instrument used to determine the extent to which SLO #4 has been met is an exam on probability. **Standard and Target for Success:** Standard for Success: 70% ASSESSMENT RUBRIC Score of 4: • Students are able to demonstrate a keen understanding about how to solve and interpret informal, experimental and mathematical probability concepts and application problems.	**Semester and Year Assessment Conducted:** 2015-16 (Spring 2016) **Standard Met? :** Standard Met Mean = 3.47 Standard Deviation = 0.84 Pearson Correlation Coefficient: -0.42 Correlation Conclusion: There is no correlation between the number of absences and performance on SLO #4. Average Number of Absences: 3.33 Sample Size: 18 Analysis and Results: The mean and standard deviation of the data for SLO #4 have remained consistent over time and exemplary results typically result when analyzing this learning outcome. The data indicates that as a collective	**Action:** In addition to examining Math 115 students' conceptual and procedural understanding of probability, the Mathematics for Teachers committee will continue to collect data about the impact of student attendance on SLO performance. This year and in subsequent years the average number of student absences will be computed to see if this information remains steady or changes over time. (05/10/2017) **Action Category:** Teaching Strategies

Course SLOs	Assessment Method Description	Results	Actions
	• Students are able to explain informal, experimental and mathematical probability concepts and applications in an exemplary fashion in both written and oral means. Score of 3: • Students are able to demonstrate a good understanding about how to solve and interpret informal, experimental and mathematical probability concepts and application problems. • Students are able to explain informal, experimental and mathematical probability concepts and applications in a competent fashion in both written and oral means. Score of 2: • Students are able to demonstrate a fair understanding about how to solve and interpret informal, experimental and mathematical probability concepts and application problems. • Students are able to explain informal, experimental and mathematical probability concepts and applications in an adequate fashion in both written and oral means. Score of 1: • Students are unable to demonstrate a reasonable understanding about how to solve and interpret informal, experimental and mathematical probability concepts and application problems. • Students are unable to	group, students are very competent in demonstrating their conceptual and procedural understanding of probability concepts and practices. The Pearson Correlation Coefficient indicates that there is no correlation between the number of absences and student performance on SLO #4. We have found this trend over the past several years and contend that attainment of this learning outcome is impacted to some degree on the attendance rates of students. (05/10/2016) **Faculty Assessment Leader:** Judy Kasabian **Faculty Contributing to Assessment:** Judy Kasabian	

Course SLOs	Assessment Method Description	Results	Actions
	explain informal, experimental and mathematical probability concepts and applications.		

ECC: MATH 116:Geometry and Measurement for Prospective Elementary School Teachers

Course SLOs	*Assessment Method Description*	*Results*	*Actions*
SLO #1 Identify Geometric Shapes - Students will identify two- and three-dimensional geometric shapes, explain their attributes and discuss the relationships among the geometric shapes. **Course SLO Status:** Active **Course SLO Assessment Cycle:** 2013-14 (Spring 2014), 2014-15 (Spring 2015), 2015-16 (Spring 2016), 2016-17 (Spring 2017) **Input Date:** 11/21/2013	**Exam/Test/Quiz -** Exams, tests, class activities and observations will be used to assess student knowledge of two- and three- dimensional shapes. **Standard and Target for Success:** Assessment Rubric Score of 4: •Students demonstrate a proficient understanding of two- and three-dimensional shapes. •Students are able to explain attributes of the shapes with no errors. •Students compare shapes and can discuss relationships among the shapes using exemplary explanations. Score of 3: •Students demonstrate a good understanding of two- and three-dimensional shapes. •Students are able to explain attributes of the shapes with minor errors. •Students compare shapes and can discuss relationships among the shapes using good explanations. Score of 2: •Students demonstrate a fair understanding of two- and three-dimensional shapes. •Students are able to explain attributes of the shapes with several errors. •Students compare shapes and can	**Semester and Year Assessment Conducted:** 2015-16 (Spring 2016) **Standard Met? :** Standard Met During the Spring 2016 semester, course SLO #1 resulted in an average of 3.28. The standard has been met, however, the overall average went down a bit from Spring 2015. In this class, whereas many students did well, the entire class was fairly consistent with good work, but not always outstanding work. Many students worked hard to understand concepts and math did not come easily to them. (09/13/2016) **Faculty Assessment Leader:** Susie Tummers **Faculty Contributing to Assessment:** Susie Tummers	**Action:** Give students a means to review (via websites) the geometric concepts that may have been forgotten since they were last in a geometry class. (06/01/2017) **Action Category:** Teaching Strategies

Course SLOs	Assessment Method Description	Results	Actions
	discuss relationships among the shapes using some explanations. Score of 1: •Students are unable to demonstrate an understanding of two- and three-dimensional shapes. •Students are unable to explain attributes of the shapes or do so with significant errors. •Students are not able to compare shapes and cannot discuss relationships among the shapes. TARGET: The class average for this SLO will be 3.0.		
SLO #2 Use Geometric Tools - Students will use geometric tools (compass, protractor, straightedge, and dynamic geometry software) to construct geometric figures. **Course SLO Status:** Active **Course SLO Assessment Cycle:** 2013-14 (Spring 2014), 2014-15 (Spring 2015), 2015-16 (Spring 2016), 2016-17 (Spring 2017) **Input Date:** 11/21/2013	**Exam/Test/Quiz -** Exams, tests, class activities, lab work and observations will be used to assess student ability to use geometric tools to construct geometric figures. **Standard and Target for Success:** Rubric for Assessment Score of 4: •Students use geometric tools proficiently to create exemplary constructions. •Students are able to explain steps in their constructions with no errors. Score of 3: •Students use geometric tools but may have a few problems in their constructions. •Students are able to explain steps in their constructions with minor errors.	**Semester and Year Assessment Conducted:** 2015-16 (Spring 2016) **Standard Met? :** Standard Met The average for SLO #2 during the Spring 2016 semester was again a 3.5. Every student in the class obtained either a 3 or 4 meaning that every student met the standard. Constructions were taught throughout the course of the semester and reviewed as necessary. (09/13/2016) **Faculty Assessment Leader:** Susie Tummers **Faculty Contributing to Assessment:** Susie Tummers	**Action:** Continue to span the constructions throughout the semester allowing students to have multiple opportunities to use geometric tools as they complete problems. (06/01/2017) **Action Category:** Teaching Strategies

Course SLOs	Assessment Method Description	Results	Actions
	Score of 2: •Students use geometric tools fairly and have problems with their constructions. •Students are able to explain steps in their constructions but have several errors. Score of 1: •Students use geometric tools poorly and are unable to complete their constructions. •Students are not able to explain steps in their constructions or have significant errors. TARGET: A class average of at least 3.0.		
SLO #3 Solve and Interpret Geometric Application Problems - Students will use the concepts of measurement to solve geometric application problems, determine the appropriateness of a solution, and if errors are made, explain the misconceptions or errors made and how to solve the problem correctly using written or oral means. **Course SLO Status:** Active **Course SLO Assessment Cycle:** 2013-14 (Spring 2014), 2014-15 (Spring 2015), 2015-16 (Spring 2016), 2016-17 (Spring 2017) **Input Date:** 11/21/2013	**Exam/Test/Quiz -** Exams, tests, class activities, and observations will be used to assess student ability to solve geometric application problems. **Standard and Target for Success:** Rubric for Assessment Score of 4: •Students demonstrate a proficient understanding of the concepts of measurement. •Students are able to solve geometric application problems with no errors. •Students are able to provide an exemplary explanation of their work in solving the application problem using written or oral means.	**Semester and Year Assessment Conducted:** 2015-16 (Spring 2016) **Standard Met? :** Standard Met The average score for SLO #3 was 3.39. Only 1 out of 18 students did not meet the standard of 3. The average score was a slight decline from Spring 2015. This maybe due to the fact that many students in this class, although eager to learn, had a difficult time with geometric concepts. (09/13/2016) **Faculty Assessment Leader:** Susie Tummers **Faculty Contributing to Assessment:** Susie Tummers	**Action:** Continue to work with individual students on procedures for using geometric measuring devices. Give students an opportunity to demonstrate their abilities while acting as a teacher for the class. (06/01/2017) **Action Category:** Teaching Strategies

Course SLOs	Assessment Method Description	Results	Actions
	Score of 3: •Students demonstrate a good understanding of the concepts of measurement. •Students are able to solve geometric application problems with minor errors. •Students are able to provide a good explanation of their work in solving the application problem using written or oral means. Score of 2: •Students demonstrate a fair understanding of the concepts of measurement. •Students are able to solve geometric application problems with several errors. •Students are able to provide a fair explanation of their work in solving the application problem using written or oral means. Score of 1: •Students are unable to demonstrate an understanding of the concepts of measurement. •Students are not able to solve geometric application problems. •Students are unable to provide an explanation of their work in solving the application problem using written or oral means. TARGET: A class average of at least 3.0.		

Course SLOs	Assessment Method Description	Results	Actions
SLO #4 Explain Geometric Formulas - Students will use words and diagrams to explain the derivation of geometric formulas. **Course SLO Status:** Active **Course SLO Assessment Cycle:** 2013-14 (Spring 2014), 2014-15 (Spring 2015), 2015-16 (Spring 2016), 2016-17 (Spring 2017) **Input Date:** 11/21/2013	**Exam/Test/Quiz -** Exams, class activities, the area project and observations will be used to assess student ability to explain the derivation of geometric formulas. **Standard and Target for Success:** Rubric for Assessment Score of 4: •Students demonstrate a proficient understanding of explaining the derivation of geometric formulas using both words and diagrams. •Students are able to explain the derivation with no errors. Score of 3: •Students demonstrate a good understanding of explaining the derivation of geometric formulas using both words and diagrams. •Students are able to explain the derivation with few errors. Score of 2: •Students demonstrate a fair understanding of explaining the derivation of geometric formulas using both words and diagrams. •Students are able to explain the derivation with several errors. Score of 1: •Students are unable to demonstrate any understanding of explaining the derivation of geometric formulas using both words or diagrams. •Students are unable to explain the	**Semester and Year Assessment Conducted:** 2015-16 (Spring 2016) **Standard Met? :** Standard Met The average for SLO #4 for Spring 2016 was 3.44. This is an improvement over Spring 2015 and 61% of the students demonstrated a proficient understanding of the explanation of geometric formulas. (09/13/2016) **Faculty Assessment Leader:** Susie Tummers **Faculty Contributing to Assessment:** Susie Tummers	**Action:** Continue having students work on partner teaching about the explanations of geometric formulas. I tried this for the first time during the Spring 2016 semester and it seems to have worked. (06/01/2017) **Action Category:** Teaching Strategies

Course SLOs	Assessment Method Description	Results	Actions
	derivation. TARGET: A class average of at least 3.0.		