Assessment: Assessment Unit Four Column

FALL 2016

El Camino: PLOs (MATH) - Computer Sciences

PLOs	*Assessment Method Description*	*Results*	*Actions*
PLO #3 Identifying and Correcting Errors - Upon completion of their course of study in the Computer Science Department, students, when given a code segment with errors, will be able to identify and correct the problems. **PLO Status:** Active **PLO Assessment Cycle:** 2016-17 (Fall 2016) **Input Date:** 07/01/2013 **Inactive Date:** **Comments:**	**Exam/Test/Quiz -** In assessing classes tests with errant code were given. Students were asked to analyze and find the error, explain the it, and suggest a solution to fix the error. **Standard and Rubric:** The table below gives rubric levels specifying the competence of students who scored in certain percentage range in SLO tests: Level Percentage Scored by a student Level of understanding/degree of SLO completion Level 5 >=90 Excellent comprehension of course SLO Level 4 89 to 80 Very good comprehension of course SLO. Level 3 79 to 70 Completion of SLO with average success. Level 2 69 to 60 Errors made are high that problems of even average difficulty were not completed.	**Semester of Current Assessment:** 2016-17 (Fall 2016) **Standard Met:** Standard Not Met About 59% students met SLO target of scoring 70% or higher. A bimodal distribution of student population is evident. That means that computer science department has students who perform at a very high level, combined with a population that does not. It is very curious that while 36% of student population performed the very best possible in SLO #3, almost same (albeit slightly reduced) percentage achieved the lowest possible performance score as well. The SLO #3 is related to students being able to analyze errors in computing code/instruction and being able to provide a fix for errors. This task requires mature analytical skills. Based on SLO results, it appears that student's analytical skills need advancement. Instructors perhaps include more error analysis in exercises done in regular assessments. Since there is a bi-modal distribution, department should further analyze the student success data from the point of view of obtaining student equity funding to help improve those students who are performing at scoring levels below 70% at this time. (03/19/2017) **Faculty Assessment Leader:** Satish Singhal **Faculty Contributing to Assessment:** Satish Singhal, Massoud Ghyam, Edwin Ambrosio, Solomon Russell, Norman Hines, Greg Scott, E. Nikjeh, Kim Davis, Dave Akins **Courses Associated with PLO Assessment:** CSCI 1, CSCI 2, CSCI 3, CSCI 16, CSCI 30, CSCI 40 **Related Documents:**	**Action:** Computer Science Instructors should include more SLO #3 type problems in the regular assessments. (06/06/2019) **Action Category:** Teaching Strategies

PLOs	Assessment Method Description	Results	Actions
	Level 1 <60 Only scant understanding of the SLO topic In Computer Science we went with 70-70 rule. If seventy percent or higher percentage of students scored seventy percent or higher in SLO assessment, then that SLO was met. **Additional Comments:** **Exam/Test/Quiz -** Exam/Test/Quiz were given with errant code. Students were asked to analyze the code, find error in t, explain the error, and finally suggest a competent fix for the error. **Standard and Rubric:** Please see attached report. **Additional Comments:**	ComputerSciencePLO_2016.docx	

Assessment: Assessment Unit Four Column

FALL 2016

El Camino: PLOs (MATH) - Developmental Math

PLOs	*Assessment Method Description*	*Results*	*Actions*
PLO #4 Articulating Mathematical Reasoning - A student completing Pre-Collegiate Mathematics will verbally articulate (orally or in writing) the mathematical reasoning they used to solve a problem or analyze a situation. **PLO Status:** Active **PLO Assessment Cycle:** 2016-17 (Fall 2016) **Input Date:** 07/01/2013 **Inactive Date:** **Comments:**	**Exam/Test/Quiz -** During the spring 2016 semester, SLO #4 (Articulating Mathematical Reasoning) was assessed for 8 development mathematics classes: Math 12, 23, 37, 40, 60, 67, 73, and 80. Problems were given to students in which they were asked to articulate the mathematical reasoning they used to solve problems. Math 12 (Basic Arithmetic Skills) The assessment is an Order of Operations problem that was performed incorrectly. The students will need to recognize and describe the mistakes and then do the problem correctly. Math 23 (Pre-Algebra) The assessment presents the student the work and solution to an equation that was solved incorrectly. The students will need to recognize and describe the mistakes and then do the problem correctly. Math 37 (Basic Accelerated Mathematics)	**Semester of Current Assessment:** 2016-17 (Fall 2016) **Standard Met:** Standard Met Of the 2350 students who were assessed in spring of 2016, 1,748 students, or 74% received a passing mark. This does not include the Math 37 students were assessed, but the results are below. Break down by class is below: Math 12 Target: 70% of students receive a passing score of 2 or 3 Results: 192/213 (90%) received a score of 2 or 3 Target MET: YES Math 23 Target: No Target was set for Math 23 Results: 255/415 (61%) received a score of passing score of 4 or 5 Target MET: Math 37 Target: 70% of students would receive a 2 or 3 on both questions Results: 171 students from eight Math 37 sections completed the SLO sometime during weeks 12 through 16 of the semester. The sample size is smaller than desired, but the results are	**Action:** The results of the SLO will be distributed to all current instructors teaching developmental math classes. Recommendations and instructional resources will also be given to instructors to help them: (1) incorporate more language into the math curriculum, (2) incorporate activities that help students improve their mathematical articulation and description of mathematical processes. (09/25/2017) **Action Category:** Teaching Strategies **Follow-Up:** This action has been only partially completed due to inadequate resources. (11/09/2017)

PLOs	Assessment Method Description	Results	Actions
	In a two question quiz, in which students compare the work of two fictional students, we hope to learn how well students can analyze and articulate the mistakes made by the two students and explain the relationship between the reverse evaluation machine and solving a related equation.. We are attaching the question and the rubric used for grading this question. Math 40 (Beginning Algebra) The assessment presents the student the work and solution to an expression that was incorrectly simplified. The students will need to recognize and describe the mistakes and then do the problem correctly. Math 60 (Geometry) Prove that one diagonal of a rectangle of a rectangle divides a rectangle into two congruent triangles. Math 67 Math 73 (Intermediate Algebra for General Education) With information given to students, students will be able to construct a linear model, give an interpretation of the slope and intercepts, and use the model to answer additional questions. Math 80 (Intermediate Algebra for Science, Technology, Engineering, and Mathematics)	still telling. On Question 1, which asked students to identify and describe errors in the two students' work, 121 students (71%) were able to identify all or some of the mistakes and 50 (29%) students were not able to identify mistakes. We barely met the standard. In the second question, in which students were asked to describe the relationship between reverse evaluations machines and the work the fictional students did solving a related equation, 94 students (55%) scored a 2 or 3 on the rubric and 77 students (45%) scored a 1. We did not meet our standard for the second question. Math 40 Target: 70% of students receive a passing score of 2 or 3 Results: 366/454 (81%) received a score of 2 or 3 Target MET: YES Math 60 Target: 75% of students receive a passing score of 2 or 3 Results: 64/93 (69%) received a score of 2 or 3 Target MET: NO Math 67 Target: 70% of students receive a passing score of 2 or 3 Results: 58/80 (73%) received a score of 2 or 3 Target MET: YES Math 73 Target: 70% of students receive a passing score of 2 or 3 Results: 462/514 (90%) received a score of 2 or 3 Target MET: YES Math 80 Target: 60% of students receive a passing score of 2 or 3 Results: 351/582 (60%) received a score of 2 or 3 Target MET: YES (02/28/2017) **Faculty Assessment Leader:** Kaysa Moreno **Faculty Contributing to Assessment:** **Courses Associated with PLO Assessment:** Math 12, Math	

PLOs	Assessment Method Description	Results	Actions
	With information given to students, students will be able to construct a linear model, give an interpretation of the slope and intercepts, and use the model to answer additional questions.	23, Math 37, Math 40, Math 60, Math 67, Math 73, Math 80	
	Standard and Rubric: Most of the math classes used 3-point rubric of: 3: The student's answers are correct and the student demonstrates complete understanding of the material. 2: The student's answers are mostly correct, with a few small errors, and the student demonstrates a reasonable understanding of the material. 1: The student has few, if any, answers correct and demonstrates minimal understanding of the material/ 0: The student has no answers correct or has left the questions blank, and shows no understanding of the material. However, Math 23 utilized as 5-point scale, which is a more refined version of the above. The goals, in terms of percentage and score, for each course are as follows:		

PLOs	Assessment Method Description	Results	Actions
	Math 12 (70% with a 2 or 3) Math 23 (____% with a 4 or 5) Math 37 (70 % with a 2 or 3 on both questions given) Math 40 (70% with a 2 or 3) Math 67 (70% with a 2 or 3) Math 73 (70% with a 2 or 3) Math 80 (60% with a 2 or 3). The overall goal was a 70% across all of developmental mathematics. Success would mean that at least 70% of the students were able to reasonably explain in writing the mathematical reasoning they used to solve the problem. **Additional Comments:**		

Assessment: Assessment Unit Four Column

FALL 2016

El Camino: PLOs (MATH) - Math (Math and Science Majors)

PLOs	*Assessment Method Description*	*Results*	*Actions*
PLO #3 Graphs - Students will create, interpret and analyze graphs relevant to the course concepts and content. **PLO Status:** Active **PLO Assessment Cycle:** 2016-17 (Fall 2016), 2020-21 (Fall 2020) **Input Date:** 05/19/2014 **Inactive Date:** **Comments:**	**Exam/Test/Quiz -** For our CM1 courses (Mathematics for STEM majors), we utilized a variety of test and quiz problems assessing students mastery of graphical analysis essential for being successful not only in their current STEM coursework but in their future STEM mathematics and science coursework at their transfer institutions. Our ultimate goal is to prepare our students for the rigors of science and math courses as well as an increasingly competitive job market. Graphical analysis in particular is central to mathematics as a science. Along with symbolic and verbal descriptions and understanding of mathematics, a visual interpretation is essential to the science. Summary of Assessments: Math 170 (Trigonometry) - Assessment consisted of students representing trigonometric functions graphically and analyzing critical properties of a trigonometric graph	**Semester of Current Assessment:** 2016-17 (Fall 2016) **Standard Met:** Standard Met Assessment Results Summary: Across all the CM1 courses administered during Fall 2016, we have the following results for SLO #3 (Graphing / Visual Problem Solving): Total Students Assessed: 1209 Scoring a '3' – 39.5% of students (or 478 students) – Demonstrate complete understanding of the problem being assessed. Scoring a '2' – 31.8% of students (or 385 students) – Demonstrate most understanding of the problem being assessed. Scoring a '1' – 20.6% of students (or 249 students) – Demonstrate some understanding of the problem being assessed. Scoring a '0' – 8.0% of students (or 97 students) – Demonstrate no understanding of the problem being assessed. Overall, we have attained a 71.4% success rate (that is, scoring a 2 or 3 on the assessment). This meets our target for success.	**Action:** We continue to explore new methods to expose students to graphical problems in STEM mathematics. While we met our goal of 70% success, we would like to increase the rigor of problems asked of students related to analyzing / construction of graphs. Perhaps in addition to asking students to sketch a related graph, we can also ask for verbal / written interpretation of the graph. (02/28/2018) **Action Category:** Teaching Strategies

PLOs	Assessment Method Description	Results	Actions
	including amplitude, period, intercepts, domain, range, and phase shift. Math 180 (Precalculus) - In our precalculus course, we assessed student understanding and mastery of parametric and polar representations of paths in 2-dimensional space. Math 190 (Calculus I) - In our first semester calculus course, we analyze students ability to use derivatives to analyze behavior of function graphs and in particular, seek out important features such as local and absolute maxima and minima, inflection points, increasing and decreasing behavior, etc… Math 191 (Calculus II) - In our second semester calculus course, we looked at student understanding and mastery of polar graphs - including sketching polar graphs and analyzing the exact area enclosed by region(s) using integration. Math 210 (Discrete Structures) - In our discrete math course for transfer students, we look at student understanding of graph theory and its use in logic. Math 220 (Calculus III) - Assessment consisted of graphical analysis in higher dimensions (for example analysis of level curves/surfaces, domain, range, contour maps, and	Analysis of Results: Overall, instructors across our CM1 courses commented on a variety of methods by which we can enhance students' abilities to use graphical techniques to solve math problems. Some of these included incorporating graphing calculators into more activities (and/or using the TI software via the projector), using computer software such as MatLab or Mathematica to sketch more involved graphs (especially for higher dimensional imagery), and incorporating more visual /graphical questions into application problems. For instance, rather than simply finding the rate of increasing interest for a finance problem, we should also ask students to sketch a graphical representation of the changing interest rates to further enhance understanding of slope/ rate of change/ increase/ decreasing behavior, etc… Many instructors also commented on a need for balance with regards to graphing utilities. While using graphing calculators is a great way to expose students to graphical understanding (especially with complicated functions impractical to sketch by hand), graphing simpler functions by hand has its benefits as well - forcing students to construct from scratch. Other methods mentioned include project-based learning, group activities, having students sketch functions on the boards, etc… Exposure to such methods not only can help reach our diverse student population but also serves to bolster marketable skills for the workplace. (02/28/2017) **Faculty Assessment Leader:** Zachary Marks **Faculty Contributing to Assessment:** **Courses Associated with PLO Assessment:** Math 170, Math 180, Math 190, Math 191, Math 210, Math 220, Math 270	

PLOs	Assessment Method Description	Results	Actions
	classifying surfaces). Math 270 (Differential Equations) - We looked at a few applications of visual interpretations in the differential equations/linear algebra course - including slope fields, phase plane analysis, and Laplace Transforms of step functions. **Standard and Rubric:** Assessment Target and Rubric: Across our CM1 courses, we establish a goal of at least 70% of our students enrolled in the STEM mathematics coursework to score a '2' or a '3' on the SLO assessments. This would mean at least 70% of our students will attain most to complete understanding of the graphical analysis involved. We utilize the following general rubric across the SLO assessments: Score of 3 (Complete Understanding) - Student demonstrates mastery of the problem being presented. Graphing techniques and strategies are well thought out and clearly presented. Student can clearly utilize the concepts of the course to solve application problems from a visual perspective. Score of 2 (Most Understanding) - Student demonstrates most understanding of the graphical analysis and visual techniques involved. With the exception of some computational errors and/or		

PLOs	Assessment Method Description	Results	Actions
	minor graphical errors, the student demonstrates strong conceptual understanding and how to graph appropriate functions / solve graphical problems. Score of 1 (Some Understanding) - While some understanding of graphical interpretation being assessed is evident, there are significant gaps. Conceptual and procedural errors in graphing functions and/or solving mathematical problems involving visual interpretations are evident. Score of 0 (No understanding) - Student demonstrates very little to no understanding of the graphical techniques used to solve the assessed problem. **Additional Comments:**		