De Anza College **SLO ARCHIVE**

Student Learning Outcomes for MATH 1D
Calculus

Team Members:

Team Leader:
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Additional Notes:

Outcomes:

Outcome 1 Phase I: Statement

Graphically and analytically synthesize and apply multivariable and vector-valued functions and their derivatives, using correct notation and mathematical precision.

Outcome 1 Phase II: Assessment Strategy Used:

Assessment Quarter: Summer 2010
Assessors: Kejian Shi
Assessment Tools: *No tools assigned*.

Outcome 1 Phase III: Reflect & Enhance

Number of people involved in Phase III: 3

Changes:
This is the first time the SLO has been assessed.

Methods:
For math 1D, we gave several test questions that we thought related to this SLO outcome and graded them according to the SLO.

Findings and Conclusions:

Generally, the results were very good. But, this can partially be because this was a summer class which usually has better students. One major need that was revealed was the student's inability to draw in 3-D. This was especially true at the beginning of the term. The students were outstanding in calculations and in their writing. After having had Math 1A, 1B, and 1C, this was partially expected. But, their ability to calculate derivatives was excellent none the less. At the end of Chapter 16, Vector Analysis, some students had trouble with concepts such as flux. Students did not seem to understand the relationship between Stokes' Theorem, Green's Theorem and Divergence Theorem. Overall, most students did indeed meet our expectations of student proficiency and student success.

Enhancement (Planned Actions)
Part I:
Since students had trouble with Stokes', Green's and the Divergence Theorems, we think it would be a good idea to bring more examples (handouts, etc.)to class explaining these. The text does NOT do a very good job giving examples. Also, we considered having a physics instructor visit the class to give some examples and explanations. Finally, going more in depth on the history of these theorems might be a good idea to try next time (again, the book gives very little history, just procedures).

Part II:
Not much... Most additional examples can be found for free on the internet and easily printed up. Having another instructor visit a class may require some time of another instructor, but not much.

Outcome 2 Phase I: Statement

Use double, triple and line integrals in applications, including Green's Theorem, Stokes' Theorem and Divergence Theorem.

Outcome 2 Phase II: Assessment Strategy Used:

Assessment Quarter: Summer 2010
Assessors: Kejian Shi
Assessment Tools: *No tools assigned*.

Outcome 2 Phase III: Reflect & Enhance

Number of people involved in Phase III: 3

Changes:
There are no changes. This is the first time the SLO has been assessed.

Methods:
For math 1D, we gave several test questions that we thought related to this SLO outcome and graded them according to the SLO.

Findings and Conclusions:
For line integrals, double integrals and triple integrals, most students were fine doing the calculations as far as figuring out the problem. However, when it came to setting up the integrals, students were not so proficient. Students (again) had trouble visualizing areas,

etc. in three dimensions which led to trouble in setting up integrals. Again, students did outstanding in calculating integrals once they were set up. Again (thankfully) most students met our expectations and were proficient in the material by the end of the class.

Enhancement (Planned Actions)
Part I:
We think that using more animations from websites, etc. would be a good idea to use in class to help students visualize three dimensional areas. We believe using more three dimensional hands-on models might help.

Part II:
Our division could invest in purchasing some 3-D models to bring to class and/or videos and/or software that show 3-D graphs better.

Outcome 3 Phase I: Statement

Synthesize the key concepts of differential, integral and multivariate calculus.

Outcome 3 Phase II: Assessment Strategy Used:

Assessment Quarter: Summer 2010
Assessors: Kejian Shi
Assessment Tools: *No tools assigned*.

Outcome 3 Phase III: Reflect & Enhance

Number of people involved in Phase III: 3

Changes:
There are no changes from last time. This is the first time the SLO is being assessed.

Methods:
For math 1D, we gave several questions on the final exam that we thought related to this SLO outcome and graded them according to the SLO.

Findings and Conclusions:
As what might be expected, several of the really good students in class definitely synthesized the major ideas. These generally were the students who received A's in the class. However, most students, although proficient in calculations, did not demonstrate great ability to synthesize the major ideas. As far as expectations, some students did meet ours but most did not for this SLO.

Enhancement (Planned Actions)
Part I:
We plan to spend more time on Chapter 16 (Vector Analysis) which requires greater practice in synthesizing ideas than on Chapter 14 and 15, which is more calculation based. We also plan to encourage more practice and "thought time" for students. In other words, not just more homework problems, but setting aside time to think about the ideas.

Part II:

Any resources from the internet that could help synthesis of ideas would be helpful. Also, increased staff time to spend with students talking about ideas (rather than simple lecturing) might be helpful. These would be more informal times of discussion held outside of class (i.e. study groups).

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