5. Please provide supporting documentation with this review that relates to this outcome(s). For example, if you're using a rubric to assess student work, attach a copy of the rubric and five student samples. If you're focusing on licensure exam data, attach a copy of your pass rate results.

IV: Conclusions

1. How have you or your staff adjusted your pedagogy (method and practice of teaching) to improve your academic quality and/or aid in some other area related to student success?

Biology faculty has embraced mandatory tutoring and supports the tutoring objectives. Given the optional opportunity to participate in a Problem Based Workshop, 93% of the Biology faculty attended. The majority of the faculty are committed to replacing the traditional lecture with high impact learning that is learner centered.

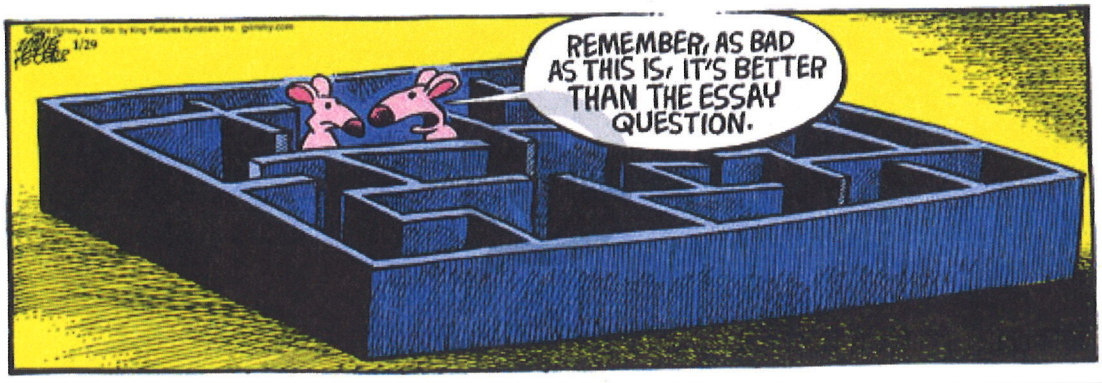
2. What program improvement opportunities are available to your staff (e.g. external curriculum committees, trainings, etc.)?

A robust Center Teaching and Learning extend learning opportunities on a regular basis. In addition, faculty search for external opportunities for improvement of pedagogy. In the past year biology faculty have been trained to use Respondus Monitor, Problem Based Learning and other institutionally hosted workshops.

3. What is the biggest issue/obstacle that your program currently faces?
Please explain the issue, point to evidence supporting why your issue is important (addressed in this document or elsewhere), explain how you would like to fix the issue, and explain any budgetary constraints.

In the past 2 years the Biology department has replaced 45% of full time faculty and staff. The part time adjuncts have also had a high percent of replacement. Moving forward over half of the department is new and inexperienced. Comprehensive training is needed to develop solid productive members to serve the students.

4. Additional Comments Pertinent to this Review (Not Required):



III: Institutional Initiatives

PART D: Core Curriculum Assessment – Program Outcomes
Complete this Section ONLY for Programs Directly Responsible for Core Curriculum Courses

Instructions: On the Annual Review, questions 1-4 will be completed by the designated department chair or program coordinator. However, each course submitted for inclusion in the core curriculum should respond to question 5 (parts a-g) and supply the documentation outlined in #6 to your department chair or program coordinator.

5. The "Call for Course Proposals for Inclusion" contains a description of each assignment/activity, direct assessment method, etc. for each of your department's/program's courses in the core curriculum.
   For each course approved for core curriculum inclusion, provide the following information:
   a) Provide a link to or copy of your data results and/or a summation of your results for each required competency for each core curriculum course in your program.

Communication skills. 94% of students participated in preparing a group presentation that earned passing grades. 6% (4 of 70) did not participate. Critical thinking skills. 70% Successfully identified their bacterial unknown. (42 of 60 submitted. Four enrolled students did not submit the assignment.) Empirical and Quantitative skills Teamwork. The majority of students participated in a group experiment on the ubiquity of organisms.

   b) Did you meet your benchmark/target in each course? If not, do you need to adjust your benchmark or adjust the instruction to meet the benchmark?

Communication skills. Yes, exceeded the benchmark of 60% success in communication skills. Critical thinking skills. Yes, exceeded the benchmark of 60% success developing the skills and applying reasoning ability to successfully identify their unknown. Empirical and Quantitative skills. No. Eleven of 66 students (17%) attempted the quantitative analysis.

Teamwork. Exceeded benchmark of 60% of students demonstrated ability to work as a member of a team to carry out a common strategy for experimentation.

c) Provide information on your data collection strategy (e.g. each faculty member collected data, sampling of student work collected across sections used, etc.):

Student work was collected from all students in each sections taught.

d) Please explain how your results were evaluated (e.g. a team evaluated the data,
data was collected from every student in the course via Blackboard, etc.):

Data was collected from every student participating in the courses at the time of the evaluated activity. All evaluated activities are laboratory exercises, students submit their work on paper and as slideshows.

e) How do you ensure your results are not biased and are reliable (i.e. inter-rater reliability)?

Artifacts are collected from all students in all sections, and evaluated using the same rubric for all students/sections. Critical thinking, Empirical and Quantitative skills and Teamwork artifacts were returned to students and thus are not included with this submission. Example Communication artifacts are included.

f) Please list the facts you feel contributed to your results (Analysis):

All students participating in the activities in all three sections were evaluated using the same rubric. The rubrics use primarily objective criteria. The rubric for Communication included peer evaluation by group members and the class to whom the project was presented. Example rubrics are included with this submission.

g) How have you or will you improve student learning in each course based on the
most recent assessment results?

I will spend more time preparing students for the empirical and quantitative analysis portion of their activity. I need to prepare a better rubric for

evaluating this activity, which will in turn provide a guideline for what to do to prepare the students.

Sam Schwarzbach

BIOL-1408 LS 1

BIOL-1409 LS 2

Spring 2015

For each course approved for core curriculum inclusion, provide the following information:

a) Provide a link to or copy of your data results and/or a summation of your results for each required competency for each core curriculum course in your program.

attached.

b) Did you meet your benchmark/target in each course? If not, do you need to adjust your benchmark or adjust the instruction to meet the benchmark?

Yes I did

c) Provide information on your data collection strategy (e.g. each faculty member collected data, sampling of student work collected across sections used, etc.):

All data was collected from my sections of a Life Science 1 & a Life Science 2 class. The data consists of grades from a lab exercise given and statistical analyses provided by the students

d) Please explain how your results were evaluated (e.g. a team evaluated the data, data was collected from every student in the course via Blackboard, etc.):

The results were taken from my 2 courses which are samples. Other sections were taught, but they did not turn in their data this semester.

e) How do you ensure your results are not biased and are reliable (i.e. inter-rater reliability)?

We will take samples from other instructors in the future. The rubrics were written objectively without subjective components.

f) Please list the facts you feel contributed to your results (Analysis):

I believe the instructions given for the assessment were clear to the students and the students were prepared by being given chances to practice the skills used in the exercise

g) How have you or will you improve student learning in each course based on the most recent assessment results?

I plan on asking for student feedback on how relevant the assessment & learned skills were to their lives and classroom instruction.

CALL FOR COURSE PROPOSALS FOR INCLUSION INTO CORE CURRICULUM

To propose a course for inclusion into the AC General Education Course List (Core Curriculum) please complete the following areas of inquiry. Please review the description of the Core Objectives (General Education competencies) from the Texas Higher Education Coordinating Board.

Course under Consideration: BIOL 1408/1308 Life Science I (for non-science majors)

Catalogue Description of the Course:

An overview of biological concepts and how they relate to the individual, the community and the world. Emphasis is placed on cell biology, genetics and evolution.

Foundational Component Area: Life and Physical Sciences

Course Student Learning Outcomes:

Lecture 1. Distinguish between prokaryotic, eukaryotic, plant and animal cells, and identify major cell structures. 2. Identify stages of the cell cycle, mitosis (plant and animal), and meiosis. 3. Interpret results from cell physiology experiments involving movement across membranes, enzymes, photosynthesis, and cellular respiration. 4. Apply genetic principles to predict the outcome of genetic crosses and statistically analyze results. 5. Describe karyotyping, pedigrees, and biotechnology and provide an example of the uses of each. 6. Identify parts of a DNA molecule, and describe replication, transcription, and translation. 7. Analyze evidence for evolution and natural selection. Laboratory 1. Apply scientific reasoning to investigate questions, and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data. 2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory. 3. Communicate effectively the results of scientific investigations. 4. Distinguish between prokaryotic, eukaryotic, plant and animal cells, and identify major cell structures. 5. Identify stages of the cell cycle, mitosis (plant and animal), and meiosis. 6. Interpret results from cell physiology experiments involving movement across membranes, enzymes, photosynthesis, and cellular respiration. 7. Apply genetic principles to predict the outcome of genetic crosses and statistically analyze results. 8. Identify the importance of karyotypes, pedigrees, and biotechnology. 9. Identify parts of a DNA molecule, and describe replication, transcription, and translation. 10. Analyze evidence for evolution and natural selection.

Communication Skills	
Brief Description of Assignment and/or Activity to fulfill Course Objectives:	Student groups will run a hypothetical classical genetic cross and design a model that will represent this genetic cross. They will collect class data and students will individually develop null and alternative hypotheses, perform Chi squared statistical analysis and construct graphs and tables to be incorporated into a report for submission.
Direct Assessment Method As applied to above Assignment/Activity	Rubric,
Brief Outline of Assessment Method(s)	Rubric will assess communication skills to include: written presentation, clarity, and supporting information.
Benchmark/Target:	65% of the students will effectively communicate the design and results from the experiment by scoring a 70% on the communication rubric.
Critical Thinking Skills	
Brief Description of Assignment and/or Activity to fulfill Course Objectives:	Student groups will run a hypothetical classical genetic cross and design a model that will represent this genetic cross. They will collect class data and students will individually develop null and alternative hypotheses, perform Chi squared statistical analysis and construct graphs and tables to be incorporated into a report for submission.
Direct Assessment Method As applied to above Assignment/Activity	Rubric,
Brief Outline of Assessment Method(s)	Rubric will assess the student's critical thinking ability by drawing correct conclusions from their results.
Benchmark/Target:	65% of the students will draw correct conclusions from their data.
Empirical and Quantitative Skills	

Brief Description of Assignment and/or Activity to fulfill Course Objectives:	Students will individually collect class experimental data and will develop null and alternative hypotheses from the experimental data, calculate Chi squared statistical values and will construct graphs and tables to be incorporated into a report for submission.
Direct Assessment Method As applied to above Assignment/Activity	Rubric,
Brief Outline of Assessment Method(s)	Rubric will assess the student's ability to correctly calculate Chi squared statistical values.
Benchmark/Target:	65% of the students will calculate the correct values.
Teamwork	
Brief Description of Assignment and/or Activity to fulfill Course Objectives:	Student groups will run a hypothetical classical genetic cross and design a model that will represent this genetic cross. They will collect class data and students will individually develop null and alternative hypotheses, perform Chi squared statistical analysis and construct graphs and tables to be incorporated into a report for submission.
Direct Assessment Method As applied to above Assignment/Activity	Juried Assessment, Rubric,
Brief Outline of Assessment Method(s)	Rubric and juried assessment will assess the studentâ€™s ability to work as a team to include individual contribution, written presentation, and delegation of duties.
Benchmark/Target:	65% of the students will demonstrate the ability to work as a team to complete the laboratory experiment.

COURSE OUTCOMES ASSESSMENTS FOR LIFE SCIENCE 1

Statistics - Chi Squared

- Students will run an experiment using coins with 2 different colored sides representing 2 different alleles: white and purple flower color.
- The purpose of this experiment is to determine if our randomly paired individuals produce offspring in the predicted ratio for a cross between two heterozygous parents.
- A Chi squared analysis will be run to test if the *null hypothesis is true*.
- A **null hypothesis** states that there is *no significant difference* between the observed results and the expected results.

Procedure

- Each student will receive a coin with white on one side and purple on the other, representing a heterozygous (Pp) individual.
- Each student will then randomly pair up with another student.
- Next each student will fill in the Punnett square below to predict the probabilities for the genotypes and phenotypes of their offspring.
- Each student will flip their coin and observe the result. Their offspring will be determined by combining the results of the 2 flipped coins.

  Eg. coin 1 - purple, coin 2 - white: Result is a heterozygous offspring.
- The students will flip the coins 5 times with the same individual to produce 5 offspring.
- The students will record their data about the resultant offspring in table 1 below.
- The students will repeat this procedure with 3 more individuals for a total of 4 crosses each.
- The class will then compile all results for the genotypes of the offspring.
- Input the class results in table 2.

Parent genotype

Parent genotype		

Use the Punnett Square to determine *expected ratios* of offspring.

Table 1

	Offspring #1	Offspring #2	Offspring #3	Offspring #4	Offspring #5
Cross #1 geno					
Cross #2 geno					
Cross #3 geno					
Cross #4 geno					

Table 2

	Expected ratios of offspring	Observed ratios of offspring
Pp x Pp	____PP : ____Pp : ____pp	____PP : ____Pp : ____pp Total =

- Using the Chi squared test with a 95% confidence interval, run statistical analyses of the data to determine if the results accept or reject the null hypothesis.
- In the space provided below show all work for your Chi-Squared equation. Then give a short explanation whether you will accept or reject the null hypothesis. Make sure to explain how your results compare with those in table 3 below.

Table 3

Degrees of Freedom (df)	Probability (p)										
	Accept the Null Hypothesis								Reject the Null Hypothesis		
	0.95	0.9	0.8	0.7	0.5	0.3	0.2	0.1	0.05	0.01	0.001
1	0.00	0.02	0.06	0.15	0.46	1.07	1.64	2.71	3.84	6.64	10.83
2	0.10	0.21	0.45	0.71	1.39	2.41	3.22	4.60	5.99	9.21	13.82
3	0.35	0.58	1.01	1.42	2.37	3.66	4.64	6.25	7.82	11.34	16.27
4	0.71	1.06	1.65	2.20	3.36	4.88	5.99	7.78	9.49	13.28	18.47
5	1.14	1.61	2.34	3.00	4.35	6.06	7.29	9.24	11.07	15.09	20.52
6	1.63	2.20	3.07	3.83	5.35	7.23	8.56	10.64	12.59	16.81	22.46
7	2.17	2.83	3.82	4.67	6.35	8.38	9.80	12.02	14.07	18.48	24.32
8	2.73	3.49	4.59	5.53	7.34	9.52	11.03	13.36	15.51	20.09	26.12
9	3.32	4.17	5.38	6.39	8.34	10.66	12.24	14.68	16.92	21.67	27.88
10	3.94	4.86	6.18	7.27	9.34	11.78	13.44	15.99	18.31	23.21	29.59
	No Significant Difference								Significant Difference		

Show all work: