UW Colleges Assessment Planning and Reporting Form 2004-2005

Email your reports to **SAC@uwc.edu**

Department	Biology
Assessment Coordinator(s)	Laura Lee

NOTE: Please attach relevant supporting information used to complete the Report Summary Sheet.

PART 1: Assessment of General Education Outcomes

Section 1: Identify the Proficiencies and Performance Indicators Assessed

- at the *Planning* stage, mark the performance indicators to be assessed in the left hand column below
- at the *Reporting* stage, report the numbers of students who did not meet, met, or exceeded expectations

	Proficiency	Performance Indicators	# Do Not Meet	# Meet	# Exceed
	B. Quantitative Skills	1. Solve quantitative and mathematical problems			
X		2. Interpret graphs, tables, and diagrams	67+81 = 148	421+247 = 668	247+192 = 439

Section 3: Use of Results

1. How did individual instructors report that they plan to use these results to improve the instructional process?

   There was general agreement that to improve, students need to practice. It was agreed to have students practice interpreting graphs in class and in the textbook, and to have students create graphs in lab from data collected. Several people spend time in class focusing on textbook graphs, more time since our assessment effort began. This is often done in labs, too, as a way to summarize lab activities or experiments using real data that students have generated. Many more will add more graphing exercises to their classes, focusing on graphing and interpreting data collected in lab, for example. Instructors indicated that it is important to relate to students that when scientists present research at meetings, etc., graphs are interpreted and explained as part of the talk. Another suggestion was to present graphing as formal topic for learning and to let students know that they will be tested on it. In the end, we all agreed that each instructor would need to decide how best to incorporate graphing into their courses.

   It is possible that at least some of the new LEC 100 courses on our campuses might be able to work on this skill. The department suggested working with the LEC 100 courses on various campuses to see if quantitative skills are taught as part of the course (as they are on the MSF campus). We will most likely assess this proficiency for one more year to see if these trends hold, and to see if LEC 100 courses address this skill.

2. What recommendations would you and/or the department assessment committee make to your department for continued improvement of the assessment process, proficiencies, performance indicators, assessment activity, rubric, and/or student performance in the discipline?

   Although this is our department's first year assessing the quantitative skills proficiency, some of last year's recommendations about the analytical skills are fairly general, and are being implemented this year. For example, there has been movement within some courses to work toward common assessment tools, so we recommend that instructors continue to work in groups, with others assessing the same courses. Within the group, instructors should encourage participation (and remind others to turn in their reports), and develop common tools where possible. Because the biology department covers such a large variety of disciplines, a single assessment tool is impossible. However, it is certainly possible that each course being assessed could use a common tool within that course. Currently, each department member creates his/her own assessment tool, and applied the common rubric to it, with his/her own rules as to putting students into the "meets, exceeds and fails to meet" categories. After having reviewed the tools, the DAC feels that they are fairly similar in terms of rigor and applicability to the proficiency. As seen in Appendix A, tools used within a course are similar, even if the content varies. Of course, common tools would be even better, in terms of validity and reliability.

   The committee feels that the institutional rubric is difficult to use (especially the "exceeds expectations" part, and encourages the DAC to work within the system to alter the rubric and make it more "user-friendly". However, the committee is pleased with student performance on this proficiency as indicated by the assessment results.

   Since last year, there have been some improvements in instructor use of rubrics, and "skill" in assessing the proficiencies. However, in spite of continued activity by the DAC and department assessment committee over the last couple of years, we still struggle to make sure that every department member understands how to use the rubrics and report the results. We have also noticed that although most department members are willing to participate in the assessment process, few seem generally interested and willing to spend the extra time to see what the process can teach us. The committee hopes to talk to members of other department assessment committees that have solved this problem, and plans to incorporate further discussion and activities in the spring department meeting to generate more genuine interest in the process. The committee feels that not enough time is being spent on assessment at department meetings; by increasing time spent on assessment at future meetings, some of these problems will be more easily solved.

3. After discussion of the results by the department, what course of action will the department take to improve student performance with respect to the assessed proficiency?

   Overall, the department is very pleased with student performance on this proficiency (88% of students assessed either met or exceeded expectations). Because this is the first year assessing this proficiency, we don't have any previous data to compare too, but we feel that there is relatively little room for further improvement. However, we have several suggestions that could be used to help the remaining 12%. The department plans to create and post a Power Point tutorial designed to help students with creating and interpreting graphs. Such a PP would be available for instructors to post on D2L sites or distribute to students as desired. We will also create and post a list of on-line references that students can access through D2L or through the department website. The biology department also has a

D2L site, with a discussion board devoted to assessment. It is hoped that instructors will share assessment tools and learning activities with their colleagues. The department hopes that instructors will use these tools to do a "graphing primer" with their students at the beginning of each semester.

PART 2: Assessment of Department-Specific Outcomes

Section 1: Identify department-specific outcomes/performance indicators.

Outcomes/Performance Indicators
1. After completing ANY biology course at the University of Wisconsin Colleges, students should be able to demonstrate an ability to interpret the graphical presentation of data.

Section 2: Attach the rubric/standards used to assess each outcome/performance indicator.

After completing ANY biology course at the University of Wisconsin Colleges, students should be able to demonstrate the following:

A. An ability to interpret the graphical presentation of data, which includes the ability to:
   1. label the X and Y axes
   2. describe the relationship between (among) the variables
   3. for a specific point on the graph, explain what data are represented (note: instructor may identify a point OR the student may be required to find a point).
   4. explain how changing a variable/factor would change the graph

A.1: ability to label the X and Y axes

Exceeds Expectations	• both axes correctly and completely labeled (appropriate combination of variable, unit of measure, dependent vs. independent, etc.)
Meets Expectations	• both axes labeled correctly, but not completely
Fails to Meet Expectations	• one or both axes labeled incorrectly

A.2: ability to describe the relationship between (among) the variables

Exceeds Expectations	• In addition to correctly identifying the trend in the data, gave a plausible explanation of what the trend shows
Meets Expectations	• correctly identified one trend shown in the data
Fails to Meet Expectations	• failed to correctly identify any trend in the data

A.3: for a specific point on the graph, ability to explain what data are represented

Exceeds Expectations	• gave an explanation of what the data at a point indicate, with units if applicable
Meets Expectations	• accurately labeled or identified a point on the graph
Fails to Meet Expectations	• incorrectly labeled or identified a point on the graph

A.4: ability to explain how changing a variable/factor would change the graph

Exceeds Expectations	• accurately predicted and plausibly explained the effect of changing a variable/factor
Meets Expectations	• accurately predicted the effect of changing a variable/factor
Fails to Meet Expectations	• inaccurately predicted the effect of changing a variable/factor

Overall assessment: Overall E = E on 2 or more performance indicators, with 0 X's
Overall X = X on 2 or more performance indicators
Overall M = any other combination of scores

Section 3: Assessment Results

Departmental Outcome/Performance Indicator	# Do Not Meet	# Meet	# Exceed
1.	84 + 96 = 180	234 + 203 = 437	240 + 168 = 408

Section 5: Use of results

1. How did individual instructors report that they plan to use these results to improve the instructional process?

   There was general agreement that to improve, students need to practice. Many faculty members mentioned that since assessing this proficiency in Spring 2004, they have included activities that have students practice interpreting graphs in class and in the textbook, and to have students create graphs in lab from data collected. Several people spent time in class focusing on textbook graphs, more time since our assessment effort began. This was often done in labs, too, as a way to summarize lab activities or experiments using real data that students have generated. To some extent, these activities have paid off. The percentage of students meeting or exceeding expectations has increased from 82% in Spring 2004, to 83.3% in 2004-2005. Although this is not a huge jump, individual instructors have reported large shifts in their results:

   > *As I used this same assessment activity last year, I closed the loop by including many more opportunities, primarily in lab reports, to allow students to create their own completely labeled graphs for data collected in laboratory assignments. This paid off in improved performance from 2004 (Overall assessment results were 17% E, 70% M, 13% X) to 2005 (Overall assessment results were 62% E, 26% M, 12% X). The percentage of students not meeting expectations did not change, but there was a substantial shift in students from Meeting to Exceeding expectations.*

   These instructors plan to continue implementing these activities/strategies in the future. Others plan to add more graphing exercises to their classes, focusing on graphing and interpreting data collected in lab, for example. Instructors indicated that it is important to relate to students that when scientists present research at meetings, etc., graphs are interpreted and explained as part of the talk. Another suggestion was to present graphing as formal topic for learning and to let students know that they will be tested on it. In the end, we

all agreed that each instructor would need to decide how best to incorporate graphing into their courses.

It is possible that at least some of the new LEC 100 courses on our campuses might be able to work on this skill. The department suggested working with the LEC 100 courses on various campuses to see if quantitative skills are taught as part of the course (as they are on the MSF campus). We will most likely assess this proficiency for one more year to see if these trends hold, and to see if LEC 100 courses address this skill.

2. What recommendations would you and/or the department assessment committee make to your department for continued improvement of the assessment process, proficiencies, performance indicators, assessment activity, rubric, and/or student performance in the discipline?

Several of last year's suggestions have already been implemented. For example, there has been movement within some courses to work toward common assessment tools, so we recommend that instructors continue to work in groups, with others assessing the same courses. Within the group, instructors should encourage participation (and remind others to turn in their reports), and develop common tools where possible. Because the biology department covers such a large variety of disciplines, a single assessment tool is impossible. However, it is certainly possible that each course being assessed could use a common tool within that course. Currently, each department member creates his/her own assessment tool, and applied the common rubric to it, with his/her own rules as to putting students into the "meets, exceeds and fails to meet" categories. After having reviewed the tools, the DAC feels that they are fairly similar in terms of rigor and applicability to the proficiency. As seen in Appendix A, tools used within a course are similar, even if the content varies. Of course, common tools would be even better, in terms of validity and reliability.

The department has followed last year's suggestion to fully implement this proficiency as the department assessment for this year. The committee and department are happy with this proficiency, its performance indicators, and the rubric, and recommend no changes to it. Because this proficiency has been used for only 3 semesters, the committee recommends using the rubric to assess this proficiency for at least one more year to "close the loop". However, we recommend that next year's assessment committee work on at least two new proficiencies and rubrics for future use.

There have been some improvements in instructor use of rubrics, and "skill" in assessing the proficiencies. However, in spite of continued activity by the DAC and department assessment committee over the last couple of years, we still struggle to make sure that every department member understands how to use the rubrics and report the results. We are currently exploring a couple of ideas on how to do this. We have also noticed that although most department members are willing to participate in the assessment process, few seem generally interested and willing to spend the extra time to see what the process can teach us. The committee hopes to talk to members of other department assessment committees that have solved this problem, and plans to incorporate further discussion and activities in the spring department meeting to generate more genuine interest in the process. The committee feels that not enough time is being spent on assessment at department meetings; by increasing time spent on assessment at future meetings, some of these problems will be more easily solved.

3. After discussion of the results by the department, what course of action will the department take to improve student performance with respect to the assessed proficiency?

   Overall, the department is very pleased with student performance on this proficiency (83.3% of students assessed either met or exceeded expectations). We feel that there is some room for improvement. However, in spite of implementing many of the suggestions from the spring 2004 report, our percent of students meeting or exceeding only increased by 1.3%. In spite of this, we do have several suggestions that could be used to help the remaining 16%. The department plans to create and post a Power Point tutorial designed to help students with creating and interpreting graphs. Such a PP would be available for instructors to post on D2L sites or distribute to students as desired. We will also create and post a list of on-line references that students can access through D2L or through the department website. The biology department also has a D2L site, with a discussion board devoted to assessment. It is hoped that instructors will share assessment tools and learning activities with their colleagues. The department hopes that instructors will use these tools to do a "graphing primer" with their students at the beginning of each semester.

PART 3: Additional Assessment and Contributions

Please ask for and include in the report information from Department members about any other assessment activities they have conducted, particularly in conjunction with grant-funded innovations. Also ask for and describe briefly any additional contributions to assessment such as publications, presentations, qualitative classroom innovations (such as Scholarship of Teaching and Learning activities), and other items relating to assessment that the department wishes to note.

Assessment Budget: The biology department spent a large portion of its allotted assessment budget. The biology assessment committee met at the UW-Marshfield/Wood County campus in August before the start of the academic year to prepare for the fall department meeting, and to preview the year's assessment activity. In 2005-2006, the committee plans to meet during each semester by conference call or by compressed video. The department used its assessment budget to extend our 1-day spring department meeting into an overnight meeting. This allowed us to spend more time on assessment reports and activities than would otherwise be possible. We plan to do the same in 2005-2006.

SoTL: A member of the biology department received a SoTL grant funded by the University of Wisconsin's Office of Professional and Instructional Development. This project is focused on assessing student understanding of the ways in which ideas are developed in the sciences, and the development of teaching tools and strategies to improve that understanding. Their current initiatives include helping students to develop the analytical skills and quantitative skills required to appreciate that not all explanations are equally valid. To this end they have developed both assessment techniques and preliminary teaching approaches that address these subjects. There are nine members of the Biological Sciences department involved in this project.

Other Assessment Activities: One member of the department reported on a BIO 109 ESFY project that assessed Information Processing/Comprehension Skills and Problem Solving/Critical Thinking Skills.

Another reported the following activities:

1) I did an informal evaluation of the learning value of solo followed by group exams, a method I use in several courses on the assumption that the discussion and immediate feedback would

promote longer retention of tested material. Unfortunately, I saw little difference between student retention of material covered and not covered by group exams.

2) I participated in FACETS, a collaborative faculty development initiative between UWSP and UWMC. It involved three evening seminars on the Millennial Generation, recent advances in cognition and learning, and reflective teaching and "backward course design." I applied for and received a summer stipend from FACETS to develop curricular materials and assessment tools to help introductory biology students better understand the nature of the various types of scientific knowledge. I will also be a participant in an OPID-funded SoTL project on this same topic beginning this summer.

Appendix A: Examples of Assessment Tools

BIO 109

Example #1

I used a post-test only format for assessing the students, and students did not have access to books or notes when doing the assessments. The assessment was done using parts of a question on the final exam, and the students were provided with the departmental rubrics to use as grading criteria while answering the question. The following is the question used:

"You have been provided with grading criteria for this question. Use the graph of population growth below to answer the following questions:

a. (2 points) Please completely label the X and Y axes.

b. (3 points) Which population curve shows logistic growth? (Choose curve 1, 2 or 3.) How can you tell?

…

d. (3 points) Which population is smallest at point 'A' on the graph? Explain your answer.

e. (2 points) Extend the line for population '1' to show what might happen if the population's food source (prey) was removed at point 'B'. Explain your answer."

I used the rubrics and all four of the performance indicators listed in the biology department assessment plan for 2004-2005.

Performance indicator A.1 was assessed by question "a" above. I was looking for the students to say that the Y axis represented the population size, and they needed to give some unit of population size (the number of organisms, for example). The students also needed to say that the X-axis represented time, and they needed to give some unit of time (months, years, etc.).

Performance indicator A.2 was assessed by question "b" above. I was looking for the students to say that the population 3 showed logistic growth. They also needed to explain that the curve for population three "leveled out" after a period of time.

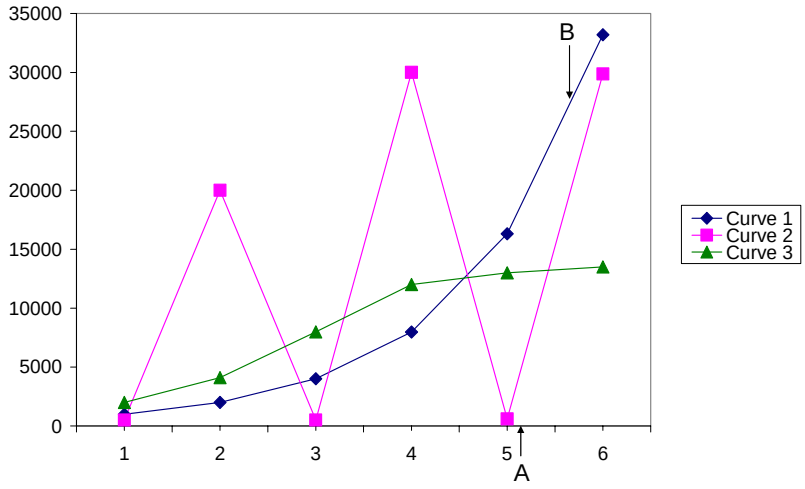
Performance indicator A.3 was assessed by question "d" above. I was looking for the students to say that the population 2 was the smallest at point "A". They also needed to explain their answer by saying that the curve of population two was the lowest of the three curves at that point. Or the students could give the sizes of each population for that point in time.

Performance indicator A.4 was assessed by question "e" above. I was looking for the students to show a decrease in the slope of the curve for population one (perhaps the slope would even become negative).

Example #2

The students were asked to identify which curves on a graph represented exponential and logistic growth, estimate the carrying capacity of a specific population, and to predict how the shape of a curve would change following the introduction of a predator.

A. Label the x and y axes. Include units if appropriate.
B. Which population curve shows exponential growth? How can you tell?
C. Which population curve shows logistic growth? How can you tell?
D. What is the carrying capacity for population A? Explain your answer.
E. Which population is largest at point 'A' on the graph?
F. Extend the line for population 1 to show what would happen if a predator were introduced at point 'B'. Explain your reasoning.



I used parts D and F in the question for institutional assessment. If the students were able to accurately identify and explain a point on a graph in part D, they exceeded expectations. If they were able to identify a point on the graph, they met expectations. If they could not identify a point on the graph, they failed to meet expectations. For part F, students exceeded expectations if they could accurately identify and explain a trend on a graph. They met expectations if they could identify a trend, and they failed to meet expectations if they could not identify a trend. Overall, students received an "E" if they exceeded expectations on both parts, they received an "X" if they failed to meet expectations for both parts, and they received an "M" for any other combination.

Parts A, B, D, and F were used in the departmental-level assessment. Students received and "E" if they were able to accurately label the x- and y-axes, and "M" if they could only identify one axis, and an "X" if they couldn't identify either. Students received an "E" if they were able to describe the relationship between variables, and correctly identify the curve showing that relationship. They received an "M" if they could either identify the relationship or provide a plausible explanation. They received an "X" if they could not do either. Students received an "E" if they could specifically identify the carrying capacity on the graph and provide an explanation. They received an "M" if they could either identify or provide an explanation, and they received an "X" if they could not do either. Students received an "E" if they could explain how changing a variable/factor would change the graph and accurately draw the change on the graph. They received an "M" if they could do either of these, and an "X" if they couldn't do either.

A student's overall performance was calculated as follows:

Exceeds (E) = E on 2 or more questions, no Xs
Fails (X) = X on 2 or more
Meets (M) = any other combination

Example #3
Lab Exam question (no notes or book)

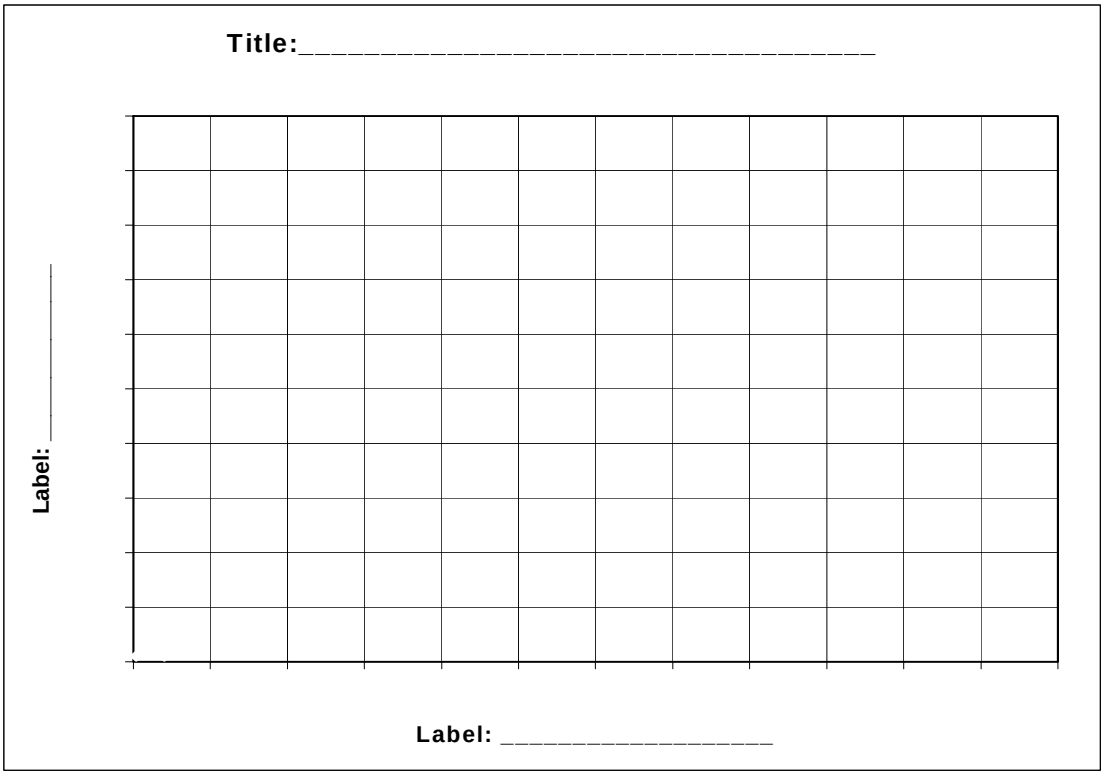
11. The table contains two data sets collected during an experiment involving diffusion of a liquid in hot water and diffusion of a liquid in cold water. The technician collecting the data forgot to define which data set was hot water and which was cold water. Do the following:

    a. Plot the data sets (plot both on same graph, but be sure to define which is which)
    b. Calculate the **initial** rates of diffusion
    c. Determine which data set was hot water and which was cold water based on what we learned

Data set #1		**Data Set #2**	
Seconds	Millimeter	Seconds	Millimeters
0	0	0	0
5	5	5	3
10	6	10	3.5
15	7	15	4
20	8	20	4
25	9	25	4.5
30	9.5	30	5

Rate of Data Set #1 = _____; hot water or cold water? (circle one)

Rate of Data Set #2 = _____; hot water or cold water? (circle one)



Institutional
Exceeds: Applies best fit lines correctly for both data sets, calculates rates of diffusion for both data sets, and recognizes which data set is for diffusion in hot water and which data set is for diffusion in cold water

Meets: Applies at 2-3 of the following: best fit lines and initial rates of diffusion correctly for diffusion in hot and/or cold water.

Fails to meet: Applies one or zero of the following: best fit line or initial rate of diffusion.

Departmental
An ability to label the X and Y axes

Exceeds: both are labeled correctly
Meets: only one is labeled correctly
Fails To Meet: neither is labeled correctly

An ability to describe the relationship between (among) variables

Exceeds: able to apply best fit line for initial diffusion rate for both data sets
Meets: able to apply best fit line for initial diffusion rate for only one data set
Fails To Meet: cannot apply best fit lines for initial diffusion rates

For a specific point on the graph, an ability to explain what data are represented

Exceeds: able to calculate initial rate of diffusion for both data sets
Meets: able to calculate initial rate of diffusion for only one data set
Fails To Meet: unable to calculate initial rate of diffusion

An ability to explain how changing a variable/factor changes the graph

Exceeds: able to identify which data set is hot water diffusion and which data set is cold water diffusion
Meets: N/A
Fails To Meet: unable to identify which data set is hot water diffusion and which data set is cold water diffusion

Overall results

Overall Exceeds: E on 2 or more performance indicators, with 0 Xs
Overall Meets: All other combinations
Overall Fails to Meet: X on 2 or more performance indicators

ZOO 101

Example #1

The graph below shows the results of stimulating a *whole muscle* with a stimulus of increasing strength delivered at the same rate.

Complete questions a-d below.

a. Label the sides of the graph.

b. What is the relationship between the strength of the stimulus and the strength of contraction in the part of the
data indicated by the "A" brackets?

Relationship: Increased strength of stimulus → _____ strength of contraction

What is the *explanation* for the relationship?

c. Explain why the relationship between the strength of the stimulus and the strength of contraction shown in the "A" bracket
ceases to occur in the area indicated by the "B" brackets.

d. Suppose that instead of stimulating the whole muscle with a stimulus of increasing strength delivered at the same rate you
kept the stimulus at the same strength but delivered it at a faster and faster rate.
Predict and explain what would happen.

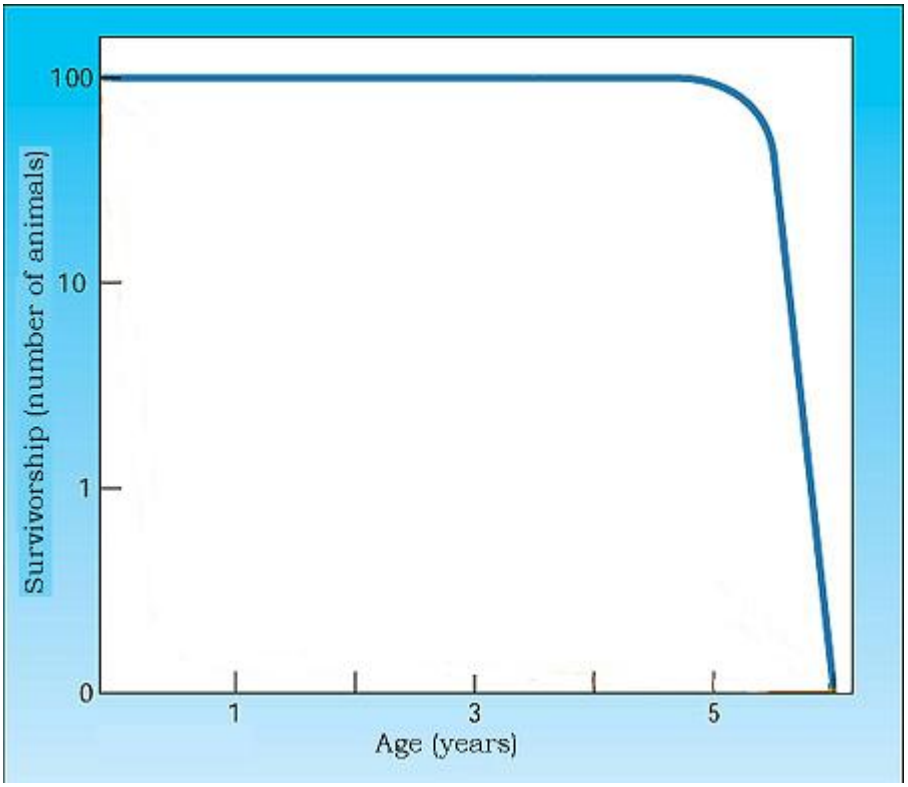
EACH OF THE FOUR PARTS OF THE QUESTION REQUIRED TWO CORRECT ANSWERS:

BOTH ANSWERS CORRECT = E
ONE CORRECT ANSWER = M
NO CORRECT ANSWERS = X

Example #2

I used a series of questions relating to a survivorship curve on the closed-book, cumulative final exam as the assessment tool. The question follows:

Survivorship Curve Diagram (1 pt. each, total = 5 pts.): Below is a diagram of an animal's survivorship curve. Specifically and completely answer the following questions referring to the diagram.



72. Fully identify the X axis on the diagram.
73. Fully identify the Y axis on the diagram.
74. What does the line on the graph represent?
75. What is survivorship at four years of age?
76. Draw a survivorship curve for a population of animals that has an equal probability of death at anytime in their life. You may draw your curve directly on the graph.

I used only my questions #74 and 75 (What does the line on the graph represent?; What is survivorship at four years of age?) to evaluate student answers. If students failed to meet expectations on either question, they failed to meet expectations overall. If they exceeded expectations on either question, they exceeded expectations overall. For all other combinations they met expectations overall.

BAC 101

Example #1

The assessment tool was a take-home assignment which required students to analyze, interpret, and evaluate graphical data pertaining to the melting temperatures of DNA with various G:C ratios. Students were presented with DNA melting curves for various microorganisms, and an unlabeled graph which plotted melting temperature of DNA for these microorganisms vs. percentage of G:C content. Students were required to 1) label the graph 2) comment on what the graph implies regarding the relationship between the stability of DNA and it's G:C content for various microorganisms and provide a suggestion as to what affects stability at the molecular level, 3) identify the bacteria represented by the individual data points using the data at hand and 4) regraph the melting curve data using A:T content. Students had access to all resources, including their textbooks. The assignment followed a lecture on DNA structure.

For the institutional portion of the assessment, I used two questions from the tool described above – one pertaining to students commenting on the relationships implied by the data (#2), and the second pertaining to ability to regraph the data (#4). These were scored as described below under departmental assessment. I felt these two questions most closely aligned with the two bullets provided by performance indicator B.2 used for institutional assessment this spring. Students overall score was determined according to the protocol determined by the department in spring of 2004.

For departmental assessment: To exceed expectations, a student was required to label the graph perfectly, correctly identify the trend demonstrated by the data, as well as the molecular basis for this trend, label the data points correctly, and draw a perfectly accurate representation of the same data transposed to reflect A:T content.

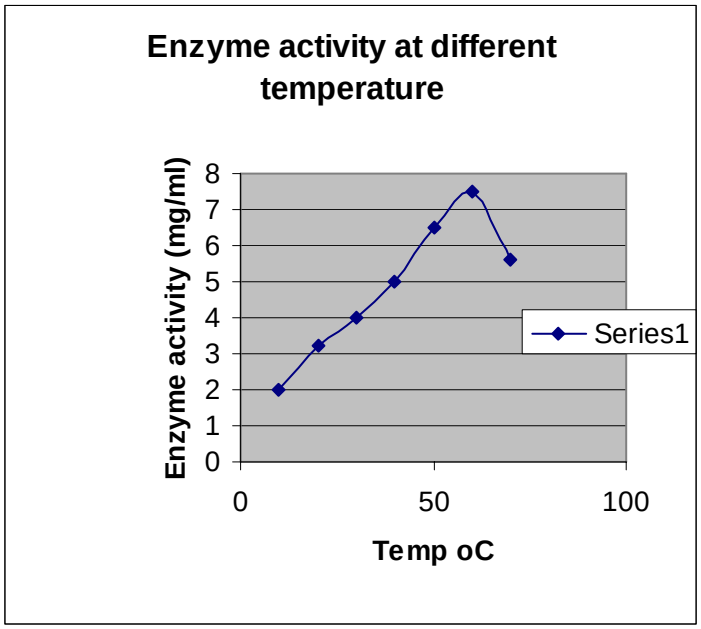
To meet expectations, a student was required to label axes correctly, but labeling may have been incomplete (e.g., no units), identify the trend demonstrated by the data, but perhaps not the molecular basis for this trend, accurately label data points correctly, and graph a representation of the transposed data that reflected the expected trend in A:T content vs. temperature.

Students failed to meet expectations if they incorrectly labeled the axes, failed to identify the trend in the data, incorrectly labeled points on the graph, or graphed a misrepresentation of the expected trend in A:T content vs. temperature

For each of the four required exercises, students were given an E, M or F based on a rubric briefly described above. An overall score of E = E on two or more performance indicators with 0 F's. An over score of F = F on 2 or more performance indicators. Any other combination of scores resulted in an M assignment.

Example #2

The assessment tool consisted of a graph based on the effect of temperature on enzyme activity of a bacterium. Students were required to describe the effect of temperature on enzyme activity. Also, they were required to compare activities at different temperatures. They were also required to predict what will happen to enzyme activity at a temperature whose data of enzyme activity was not given. To further test their knowledge of the subject matter, they needed to predict what would happen to enzyme activity at a higher temperature



NOTE: THE GRAPH GIVEN WAS NOT LABELED AT ALL. IT WAS HAND –DRAWN. I HAD TO DO THIS ON EXCEL TO FACILITATE SENDING WITHOUT HAVING TO SCAN.

Institutional

*Being able to label the axes (Partially = M;; not at all = X) being able to label both with the correct designations and what they actually represent in the experiment ie enzyme activity on the Y axis and temperature on the X axis plus the units (Fully = E) *Being able to compare two points on the graph, projecting from the point to both axes

*Being able to explain the trend in enzyme activities as temperature increases.
Full explanation= E
Partial explanation=M
No explanation =X

*Comparing enzyme activities at two different temperature was used as an index of their knowing the values at those points
Accurate comparison, using higher than, or lower than, with precise description of their relationships, such as “half of” or “¾ of” = E
Satisfactory comparison, such as “lower than’, “higher than” or, “equal to” = M
No comparison, or wrong comparison = X

Departmental

*Being able to label the axes (Partially = M;; not at all = X) being able to label both with the correct designations and what they actually represent in the experiment ie enzyme activity on the Y axis and temperature on the X axis plus the units (Fully = E) *Being able to compare two points on the graph, projecting from the point to both axes

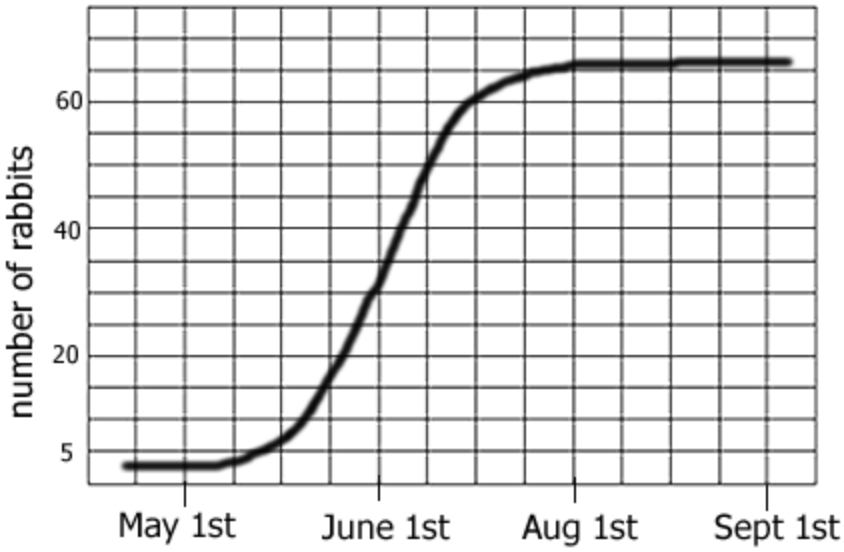
*Being able to explain the trend in enzyme activities as temperature increases.
Full explanation= E
Partial explanation=M
No explanation =X

*Comparing enzyme activities at two different temperature was used as an index of their knowing the values at those points
Accurate comparison, using higher than, or lower than, with precise description of their relationships, such as “half of” or “¾ of” = E
Satisfactory comparison, such as “lower than’, “higher than” or, “equal to” = M
No comparison, or wrong comparison = X

BIO 103/BIO 107

Example #1

Assessment was several questions regarding a population growth curve that appeared in a mid-term exam. It was a closed book exam.



13. During which month were rabbits in exponential growth (3)? _____

14. Provide the approximate x and y coordinates from this graph that correspond to the point at which the population initially reaches its carrying capacity (4).

X: _____

Y:_____

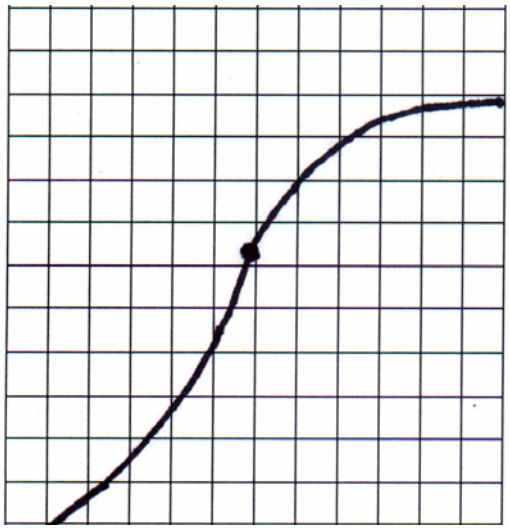
15. Assume that there is a predator that is a consideration in setting the carrying capacity in this environment. Use a dotted line to draw how the graph might change if the predator were eliminated (3).

16. Discuss the relative death rate vs. birth rate at the point in the curve labeled A (3).

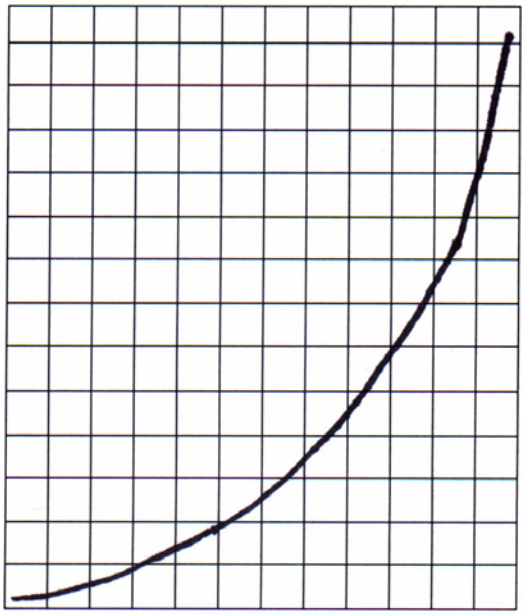
For indicator A1, I used question number 14 above. E = completely correct, M = correct, but x and y-axes reversed, X= any other.
For indicator A2, I used question number 13 above. E = distinctly correct, M = includes broad dates that include exponential growth, X= any other.
For indicator A3 I used question number 16 above. E = A correct answer that incorporated the term carrying capacity and/or equilibrium, M = correct answer, X= any other.
For indicator A4 I used question 15 above. E = a line resulting in new, higher equilibrium, M= line demonstrating continuing population growth or higher populations, X = any other.

Example #2

STUDENTS ARE ASKED TO ANSWER QUESTIONS RELEVANT TO THE DIAGRAMS BELOW. IN ADDITION THEY ARE ASK TO LABEL THE X AND Y AXIS; DESCRIBE THE RELATIONSHIP BETWEEN TWO VARIABLES: CORRECTLY INTERPRET A POINT ON THE GRAPH: AND FINALLY CONSIDER THE CONSEQUENCES OF CHANGING A VARIABLE/PLOT ON THE GRAPH.



A



B

1). The data points (Lines) on the graphs (A and B) above, represent population growth curves; with that information please apply the appropriate dependent (x) and independent (y) variable labels to the graphs.

2). Compare graphs A and B. Graph A represents what type of Population Growth curve? Graph B represents what type of Population Growth curve?

3). In Graph A, there is a point plotted (•) which indicates that this population is in part of the population growth phases referred to as what? In graph B when compared to A, one potential growth phase is lacking compared to A. What is this growth phase called?

4). In Graph A the configuration of the growth curve is different from the configuration of the growth curve in Graph B. What is general name of the condition that causes the population growth curve to finally appear as it does in Graph A.? What are some specific factors that cause a population to assume that Graph A type growth curve. What is a general term for all these factors taken together?\

A.1: ability to label the X and Y axes

Exceeds Expectations	• both axes correctly and completely labeled (appropriate combination of variable, unit of measure, dependent vs. independent, etc.) • NUMBERS OF INDIVIDUALS VERSUS TIME
Meets Expectations	• both axes labeled correctly, but not completely
Fails to Meet Expectations	• one or both axes labeled incorrectly

A.2: ability to describe the relationship between (among) the variables

Exceeds Expectations	• In addition to correctly identifying the trend in the data, gave a plausible explanation of what the trend shows GRAPH A – S – SHAPED/LOGISTIC CURVE; GRAPH B – J/EXPONENTIAL SHAPED CURVE
Meets Expectations	• correctly identified one trend shown in the data
Fails to Meet Expectations	• failed to correctly identify any trend in the data

A.3: for a specific point on the graph, ability to explain what data are represented

Exceeds Expectations	• gave an explanation of what the data at a point indicate, with units if applicable. • POINT INDICATED IS THE LOG/EXPONTENTIAL PHASE OF GROWTH. ONE POTENTIAL GROWTH PHASE LACKING IS THE STATIONARY PHASE
Meets Expectations	• accurately labeled or identified a point on the graph
Fails to Meet Expectations	• incorrectly labeled or identified a point on the graph

A.4: ability to explain how changing a variable/factor would change the graph

Exceeds Expectations	• accurately predicted and plausibly explained the effect of changing a variable/factor • CONDITION THAT CAUSES THE

	POPULATION TO BECOME STATIONARY IS KNOW AS THE CARRYING CAPACITY OF THE ENVIRONMENT. POSSIBLE SPECIFIC FACTORS ARE: ENERGY SUPPLIES, NATURAL RESOUCES SUPPLIES; WASTE ACCUMULATION; AND SPECIES INTERACTIONS. GENERAL TERM FOR ALL OF THESE ARE LIMITING FACTORS OR ENVIRONMENTAL RESISTANCE.
Meets Expectations	• accurately predicted the effect of changing a variable/factor
Fails to Meet Expectations	• inaccurately predicted the effect of changing a variable/factor

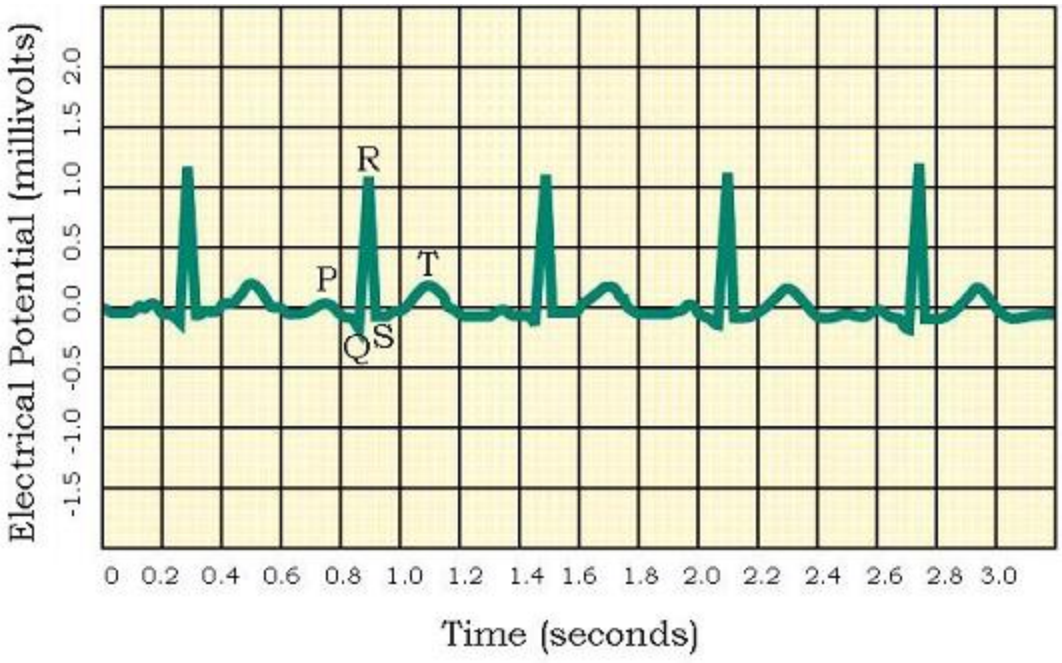
Overall assessment: Overall E = E on 2 or more performance indicators, with 0 X's
Overall X = X on 2 or more performance indicators
Overall M = any other combination of scores

Various Anatomy & Physiology Courses (PHS 230, PHS 202, PHS 203, ZOO 234, PHS 235)

Example #1

I used a series of questions given as extra credit relating to an electrocardiogram on the closed-book, cumulative final exam as the assessment tool. The question follows:

ECG Diagram (1 pt. each, total = 5 pts.): Below is a diagram of an electrocardiogram. Specifically and completely answer the following questions referring to the diagram.



97. Fully identify the X axis on the diagram.
98. Fully identify the Y axis on the diagram.
99. What does the line on the graph represent?
100. What is the electrical potential at the peak of the QRS wave?
101. If the patient's heart rate increased significantly, describe how this would change the graph.

Institutional: I used only my questions #99 and 100 (What does the line on the graph represent?; What is the electrical potential at the peak of the QRS wave?) to evaluate student answers. If students failed to meet expectations on either question, they failed to meet expectations overall. If they exceeded expectations on either question, they exceeded expectations overall. For all other combinations they met expectations overall.

I used the department rubric exactly to evaluate student answers as follows:

97. Fully identify the X axis on the diagram.
98. Fully identify the Y axis on the diagram.

Exceeds Expectations	• both axes correctly and completely labeled (appropriate combination of variable, unit of measure, dependent vs. independent, etc.)
Meets Expectations	• both axes labeled correctly, but not completely
Fails to Meet Expectations	• one or both axes labeled incorrectly

99. What does the line on the graph represent?

Exceeds Expectations	• In addition to correctly identifying the trend in the data, gave a plausible explanation of what the trend shows
Meets Expectations	• correctly identified one trend shown in the data
Fails to Meet Expectations	• failed to correctly identify any trend in the data

100. What is survivorship at four years of age?

Exceeds Expectations	• gave an explanation of what the data at a point indicate, with units if applicable
Meets Expectations	• accurately labeled or identified a point on the graph
Fails to Meet Expectations	• incorrectly labeled or identified a point on the graph

101. If the patient's heart rate increased significantly, describe how this would change the graph?

Exceeds Expectations	• accurately predicted and plausibly explained the effect of changing a variable/factor
Meets Expectations	• accurately predicted the effect of changing a variable/factor
Fails to Meet Expectations	• inaccurately predicted the effect of changing a variable/factor

Example #2

This semester, I used three questions on the final exam. Students were informed in the syllabus that regular graded material during the semester would be used for assessment, but they did not know which exercises or questions I would choose. The questions addressed the institutional Performance Indicator B.2: *Interpret graphs, tables, and diagrams*.

Question #1: I asked students to draw and correctly label the EKG waveform. For assessment, I looked solely at if they correctly placed the axes labels (millivolts and milliseconds) on the graph. This addressed Departmental Proficiency *A.1: Ability to label the X and Y axes.*

Question #2: I provided students with a graph showing the oxygen dissociation curve for hemoglobin under two pH conditions. I asked students to determine the percent saturation of oxygen in hemoglobin under a particular pH from the graph. This addressed Departmental Proficiency *A.3: For a specific point on the graph, explain what data are represented.*

Question #3: I again used the graph showing oxygen dissociation curve for hemoglobin under two pH conditions. Each pH condition was represented by a separate line on the graph. I asked students to determine the effect of lowering pH on the oxygen dissociation. This question addressed Departmental Proficiency A.4.: *Ability to explain how changing a variable/factor would change the graph.*

I examined Performance Indicator B.2: *Interpret graphs, tables, and diagrams* as directed. As agreed upon at the fall department meeting, the rubrics were to "Accurately identify and explain a point on a graph" and "Accurately identify and explain a trend represented in a graph". Answers were not evaluated on the basis of content and course material, but simply on demonstrated graphing skills.

For the overall assessment, if the student met or exceeded my expectations for all three questions, they were assigned an "E". If they incorrectly answered two or more of the questions, they were assigned an "X". Otherwise, they were placed in the "M" category.

Departmental: For Proficiency A.1.: *Ability to label the X and Y axes*, I used Tool #2 (see above). Only if the student appropriately labeled (with units) and scaled both axes did they exceed my expectations. All but one student did this correctly.

For Proficiency A3: *For a specific point on the graph, explain what data are represented,* I used Tool #1. This was straightforward. I did not have them "explain" the location of the point, as outlined in the departmental rubric, so it could be argued that the "E" and "M" were melded into one.

For Proficiency A4: *Ability to explain how changing a variable/factor would change the graph,* I used Tool #3. Since their answer was either right or wrong, I could place students only into "E" or "X" categories.