CAT 2
Quantitative Reasoning and Scientific Inquiry

**Competency 2:** The USC Upstate graduate should demonstrate an understanding of and an ability to apply scientific investigation and quantitative and logical reasoning.

- **2.1** Students demonstrate an ability to apply scientific reasoning by drawing appropriate conclusions from scientific data.
- **2.2** Students demonstrate an ability to apply quantitative and logical reasoning by producing solutions to or analyses of appropriate problems.

~Approved by Faculty Senate Spring 2009

**Assessment Measures**

### 2.1 CAAP Science Test

The CAAP Science Test is a 45-item, 40-minute multiple-choice test designed to measure scientific reasoning skills generally acquired in introductory college science courses. It assumes no factual recall from any particular science course, but is based on principles taught in all lower-division science courses. The test consists of eight passage sets, each of which contains scientific information and a set of multiple-choice test questions. A passage may conform to one of the three different formats listed below.

- **Data Representation.** This format presents students with graphic and tabular material similar to that found in science journals and texts. The items associated with this format measures skills such as graph reading, interpretation of scatter plots, and interpretation of information presented in tables, diagrams, and figures.

- **Research Summaries.** This format provides students with descriptions of one experiment or of several related experiments. The items focus on the design of experiments and the interpretation of experimental results. The stimulus and items are written expressly for the Science Test, and all relevant information is completely presented in the text of the stimulus or in the test questions.

- **Conflicting Viewpoints.** This format presents students with several hypotheses or views that are mutually inconsistent owing to differing premises, incomplete or disputed data, or differing interpretations of data. The stimuli may include illustrative charts, graphs, tables, diagrams, or figures. Items in this format measure students' skills in understanding, analyzing, and comparing alternative viewpoints or hypotheses.

The test questions require students to understand the information provided, examine interrelationships, and generalize in order to gain new information, draw conclusions, or make predictions. It can be conceptualized in three major groups. Each group is meant to address an important major element of scientific inquiry. The groups are listed below, along with brief descriptions of typical knowledge and skills tested.

- **Understanding.** Identify and evaluate scientific concepts, assumptions, and components of an experimental design or process; identify and evaluate data presented in graphs, figures, or tables; translate given data into an alternate form.

- **Analyzing.** Process information needed to draw conclusions or to formulate hypotheses; determine whether information provided supports a given hypothesis or conclusion; evaluate, compare, and contrast experimental designs or viewpoints; specify alternative ways of testing hypotheses or viewpoints.

- **Generalizing.** Extend information given to a broader or different context; generate a model consistent with given information; develop new procedures to gain new information; use given information to predict outcomes.
2.2 Measure of Academic Proficiency and Progress (MAPP) Mathematics Skill Area*

Description: MAPP is measure of college-level reading, mathematics, writing, and critical thinking in the context of the humanities, social sciences, and natural sciences. It is designed to measure the academic skills developed through general education courses, rather than the subject knowledge specifically taught in those courses. All of the subject knowledge required to answer each question is contained in the question itself or in the stimulus materials that accompany the questions. Mathematics questions measure students’ ability to:

- Recognize and interpret mathematical terms
- Read and interpret tables and graphs
- Evaluate formulas
- Order and compare large and small numbers
- Interpret ratios, proportions, and percentages
- Read scientific measuring instruments
- Recognize and use equivalent mathematical formulas or expressions

Within the mathematics skill area, the specific skills tested by the MAPP are classified into three proficiency levels. Each proficiency level is defined in terms of a set of specific competencies expected of students:

**Level I**
Students who are proficient can:

- solve word problems that would most likely be solved by arithmetic and do not involve conversion of units or proportionality. These problems can be multi-step if the steps are repeated rather than embedded.
- solve problems involving the informal properties of numbers and operations, often involving the Number Line, including positive and negative numbers, whole numbers and fractions (including conversions of common fractions to percent, such as converting "1/4" to 25%)
- solve problems requiring a general understanding of square roots and the squares of numbers
- solve a simple equation or substitute numbers into an algebraic expression
- find information from a graph. This task may involve finding a specified piece of information in a graph that also contains other information.

**Level II**
Students who are proficient can:

- solve arithmetic problems with some complications, such as complex wording, maximizing or minimizing, and embedded ratios. These problems include algebra problems that can be solved by arithmetic (the answer choices are numeric).
- simplify algebraic expressions, perform basic translations, and draw conclusions from algebraic equations and inequalities. These tasks are more complicated than solving a simple equation, though they may be approached arithmetically by substituting numbers.
- interpret a trend represented in a graph, or choose a graph that reflects a trend
- solve problems involving sets; problems have numeric answer choices

**Level III**
Students who are proficient can:

- solve word problems that would be unlikely to be solved by arithmetic; the answer choices are either algebraic expressions or numbers that do not lend themselves to back-solving
- solve problems involving difficult arithmetic concepts such as exponents and roots other than squares and square roots and percent of increase or decrease
- generalize about numbers, (e.g., identify the values of (x) for which an expression increases as (x) increases)
- solve problems requiring an understanding of the properties of integers, rational numbers, etc.
- interpret a graph in which the trends are to be expressed algebraically or one of the following is involved: exponents and roots other than squares and square roots, percent of increase or decrease
- solve problems requiring insight or logical reasoning

*The MAPP will be known as the Proficiency Profile (PP) beginning in Fall 2010*
Assessment Results

**SLO 2.1—CAAP Science Test**

CAAP Science Results Spring 2010

N=131

<table>
<thead>
<tr>
<th>Participant Gender</th>
<th>Student Body Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male=33 (25%)</td>
<td>Male=35%</td>
</tr>
<tr>
<td>Female=96 (73%)</td>
<td>Female=65%</td>
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<td>Blank=2 (2%)</td>
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<table>
<thead>
<tr>
<th></th>
<th>Upstate</th>
<th>Nat'l</th>
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<tr>
<td>Scaled Score Avg</td>
<td>61.1</td>
<td>61.7</td>
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<tr>
<td>Standard Dev</td>
<td>3.9</td>
<td>4.5</td>
</tr>
<tr>
<td>N</td>
<td>131</td>
<td>16416</td>
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Range=40-80

USC Upstate Percentile: 50th

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Avg</th>
<th>Nat'l% Avg</th>
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<tbody>
<tr>
<td>Math</td>
<td>4</td>
<td>68.13</td>
<td>84</td>
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<tr>
<td>Biology</td>
<td>24</td>
<td>64.24</td>
<td>65</td>
</tr>
<tr>
<td>History</td>
<td>7</td>
<td>61.46</td>
<td>52</td>
</tr>
<tr>
<td>Nursing</td>
<td>41</td>
<td>61.44</td>
<td>47</td>
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<tr>
<td>Education</td>
<td>49</td>
<td>60.24</td>
<td>40</td>
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**SLO 2.2—MAPP Mathematics Skill Area**

<table>
<thead>
<tr>
<th>Score</th>
<th>Spring 2010 (N=168)</th>
<th>Spring 2008 (N=460)</th>
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<tbody>
<tr>
<td></td>
<td>Our Mean</td>
<td>SD</td>
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<tr>
<td>Mathematics</td>
<td>112.79</td>
<td>5.53</td>
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<table>
<thead>
<tr>
<th>Score</th>
<th>Spring 2010 (N=168)</th>
<th>Spring 2008 (N=460)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics, Level 1</td>
<td>59%</td>
<td>21%</td>
</tr>
<tr>
<td>Mathematics, Level 2</td>
<td>27%</td>
<td>30%</td>
</tr>
<tr>
<td>Mathematics, Level 3</td>
<td>6%</td>
<td>15%</td>
</tr>
</tbody>
</table>

*The MAPP will be known as the Proficiency Profile (PP) beginning in Fall 2010*
### Assessment Results (continued)

<table>
<thead>
<tr>
<th>Department</th>
<th>N</th>
<th>Mean Score Mathematics</th>
<th>Mean Total MAPP Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>83</td>
<td>(50%) 114.43</td>
<td>443.01</td>
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<tr>
<td>Criminal Justice</td>
<td>9</td>
<td>(7%) 109.00</td>
<td>431.00</td>
</tr>
<tr>
<td>IDS</td>
<td>42</td>
<td>(25%) 111.86</td>
<td>445.55</td>
</tr>
<tr>
<td>Nonprofit</td>
<td>6</td>
<td>(4%) 110.5</td>
<td>429.67</td>
</tr>
<tr>
<td>Political Science</td>
<td>5</td>
<td>(3%) 112.60</td>
<td>449.80</td>
</tr>
<tr>
<td>SOE ECE</td>
<td>22</td>
<td>(13%) 110.86</td>
<td>443.91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean Score Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>109</td>
<td>(65%) 112.03</td>
</tr>
<tr>
<td>Male</td>
<td>58</td>
<td>(35%) 114.33</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bottom 25%</th>
<th>Top 22%</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N=42)</td>
<td>(N=37)</td>
</tr>
<tr>
<td>Range</td>
<td>101-108</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>33 (79%)</td>
</tr>
<tr>
<td>Male</td>
<td>9 (21%)</td>
</tr>
<tr>
<td>Department</td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td>12 (29%)</td>
</tr>
<tr>
<td>Criminal Justice</td>
<td>5 (12%)</td>
</tr>
<tr>
<td>IDS</td>
<td>12 (29%)</td>
</tr>
<tr>
<td>Nonprofit</td>
<td>3 (7%)</td>
</tr>
<tr>
<td>Political Science</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>SOE ECE</td>
<td>10 (24%)</td>
</tr>
</tbody>
</table>
CAT findings from data

Members of CAT 2 were generally pleased with students’ performance on both the CAAP Science and the MAPP Mathematics Skill Area assessments. In both cases, the University’s mean scores approximated the national averages.

An investigation of the CAAP Science scores did not indicate major differences by program. While the sample sizes are small, these findings suggest that students meet the requirements of SLO 2.1 regardless of the discipline (i.e., non-science-related majors scored about as well as science-related majors on the CAAP Science assessment). The CAAP Science results were also disaggregated by gender revealing no significant differences.

Similarly, the MAPP assessment did not appear affected by major. Because the MAPP provides more detailed data, the CAT looked at the 20% of participants who were rated “Not Proficient” at Mathematics Level 1 and also compared the bottom 25% of scores with the top scorers. A higher percent of females were in both the “Not Proficient” and the “bottom 25%” groups than were in the overall group of participants, and a much lower percent of females were in the “top 22%” group. Additionally, there was a smaller percent of Business majors in the two low-scoring groups than in the overall participant set, and there was a larger percent of Business majors in the high-scoring group. Because this is the first time this type of analysis has been done, the CAT is hesitant to place importance on these disaggregated results. Intuitively, it would seem to make sense that Business majors would perform well on assessments of mathematics skill because of reiteration of mathematical concepts in the coursework required (i.e., accounting, finance, economics, etc...). The CAT will continue reviewing similar data in future administrations in hopes of better understanding this.

The CAT found the data received from the CAAP administration to be less than ideal in determining specific areas of focus for future improvement on SLO 2.1. Although improvement in any area of the assessment of scientific reasoning would benefit students, the CAT is investigating additional methods of obtaining data regarding areas that would benefit from more focused improvement methods.
Suggestions for improvement (from CAT to departments with courses supporting this competency)

Based on the data collected from the first administration of the CAAP Science assessment and the second administration of MAPP, CAT 2 offers the following ideas for improvement measures that could be implemented in courses supporting the Quantitative Reasoning and Scientific Inquiry competency. These are only suggestions and this list is not exhaustive. Feel free to develop different improvement measures that fit better with your course(s). Keep in mind that the modifications should be geared at improving students’ abilities related to the SLOs, not just to the tests used to assess students’ abilities. If you would like to discuss these or other improvement measures, please contact a member of CAT 2.

- Develop a new activity or expand existing activities that involve reading, explaining, and critically evaluating discipline-specific mass media.
- Require students to interpret graphs found in the discipline’s scholarship or other research materials when possible. (Interpretation could be homework, in-class discussion, test item, etc....)
- Provide activities that have students compare and contrast contradictory hypotheses and cite data and/or observations to support one over the other.
- When discussing research related to the course topic, encourage students to identify the hypotheses, describe the experiment, examine and understand graphical and tabular representations of the results, and investigate potential next steps or shortcomings of the study.
- Require students to attend research symposiums.
- Use more applications and/or scenarios requiring students to translate verbal information to mathematical models.
- Incorporate opportunities for students to complete conversions (fractions to percents, liters to milliliters, etc...).
- Provide students with raw data and require them to identify trends and make predictions.
Action Plan (from departments with courses supporting this competency)

Note: all actions to be implemented beginning Spring 2011

Department: History, Political Science, Philosophy, & American Studies

Course(s):

SGIS 301: Introduction to Political Science

- Use graphs during lectures and encourage students to evaluate and interpret them.
- Make use of journal articles and/or current events from mass media to illustrate points during lectures.
- Require students to present a current event once during the semester that is related to the class discussion that day/week.
- Include as part of the syllabus a week or so discussion of basic research methods. This could help teach students the basics of hypotheses, analyzing data, etc.

SLGC 205: Introduction to Logic and Rhetoric

- Require students to identify the premises and conclusions in various argumentative passages throughout the semester, beginning with simple passages and ending with longer argumentative essays.
- Students will be asked to identify the nature of the arguments with which they are presented, e.g. deductive arguments, inductive arguments, generalizations, arguments from authority, etc.
- Students will be required to learn the effective ways of evaluating arguments, e.g. attacking the premises or the weakness of their support.
- Students will be asked to argue soundly for a position and then be asked to evaluate whether the argument was successful.

SLGC 207: Deductive Logic

- Require students to identify the premises and conclusions in various argumentative passages throughout the semester.
- Require students to identify the nature of the arguments with which they are presented, e.g., deductive arguments, inductive arguments, generalizations, arguments from authority, etc.
- Required students to learn the effective ways of evaluating arguments, e.g., attacking the premises or the weakness of their support.
- Require different theories of deduction, e.g., Aristotelian and propositional logics.

Department Chair Signature: ___________________________ Date: November 3, 2010
### Action Plan (from departments with courses supporting this competency)

**Department:** Informatics  
**Course(s):** SIMS 101

<table>
<thead>
<tr>
<th>SLO 2.1 Scientific conclusions...</th>
<th>SLO 2.2 Quantitative/logical analysis...</th>
</tr>
</thead>
</table>

In phase 1 of the 4-phase project students make some type of assertion (e.g. "Since 2001, Teenage Pregnancies are Increasing"). Sources are discovered that may or may not prove their assertion.

In phase 2 of the 4-phase project, students use statistical and graphing/trend line/linear regression functions to determine if the data supports their assertion.
Action Plan (from departments with courses supporting this competency)

Department:
Course(s):

SECO 291
SLO 2.2: Additional exercises requiring the translation of verbal information to mathematical models. Problem identification continues to be a challenge for some students. For example, match the correct statistical formula with the problem.

SECO 222
SLO 2.2: When covering price elasticity of demand, require students to make extensive arithmetic conversions among and between decimals, fractions, and percents.

SECO 221
SLO 2.2: Require students to interpret graphs that illustrate the impact of expansionary and contractionary fiscal policy using the Aggregate Demand – Aggregate Supply model (homework assignment).

Department Chair Signature: ________________________ Date: ____________________
**Action Plan (from departments with courses supporting this competency)**

| Department: Mathematics and Computer Science | Course(s): SMTH 102, 120, 121, 122, 126, 127, 141, 142, 202, 231  
| SCSC 138, 150 |

Require students to interpret graphs found in the discipline’s scholarship or other research materials when possible. (Interpretation could be homework, in-class discussion, test items, etc.)

Based on this suggestion, faculty teaching these courses will put more emphasis on graphing techniques. This will involve both construction and interpretation of graphs and associated information.

Department Chair Signature: Jerome Lewis  
Date: 11/24/10
Gen Ed CAT 2
Quantitative Reasoning and Scientific Inquiry

Action Plan

Department: Psychology

Course: SPSY 101 – Introduction to Psychology

Competency 2

SLO 2.1: Students demonstrate an ability to apply scientific reasoning by drawing appropriate conclusions from scientific data.

In addition to lecture material on correlation coefficients, true experiments, and determining cause and effect, there will be an exercise on designing a true experiment.
Gen Ed CAT 2
Quantitative Reasoning and Scientific Inquiry
Action Plan

Department: Psychology
Course: SPSY 225 – Psychological Statistics

Competency 2

SLO 2.2: Students demonstrate an ability to apply quantitative and logical reasoning by producing solutions to or analyses of appropriate problems.

Lectures and assigned homework will include solutions of problems by choosing and conducting appropriate statistical procedures and interpreting the results. Students will also conduct an independent project in which each student analyzes a data set and produces solutions to problems.
Action Plan

Department: Sociology, Criminal Justice, and Women’s Studies

Course(s): SOC 201

2.1 Students demonstrate an ability to apply scientific reasoning by drawing appropriate conclusions from scientific data.

- Soc 201 students are required to interpret the results of a variety of hypothesis tests and to state their findings/decisions in both statistical language and plain English.

2.2 Students demonstrate an ability to apply quantitative and logical reasoning by producing solutions to or analyses of appropriate problems.

- Soc 201 students are required to choose the appropriate hypothesis test(s) for use with various types of data, to conduct these tests and interpret the results in terms of the relevant variables.

GEG 201

- Assignment: Calculation of stream flow measured per square mile for many streams in the world. The students are given the area in square miles of the drainage basin and the average stream flow to determine where the greatest amount of water is moving down major rivers of the world including the USA. The purpose is to have them understand that particular stream basins in the Tropics generate far more than basins in some of the drier parts of the world.

GEG 202

- Assignment: Determining latitudes and longitudes for particular places and then translating the degrees minutes and seconds into miles to develop a sense of what these distances mean in familiar units of measure. By the time students finish they have become aware of not only curving surfaces but the idea of arc distances on a circular object like the surface of the Earth.

Department Chair Signature: [Signature] Date: 12/6/10
Action Plan (from departments with courses supporting this competency)

Department: Natural Sciences and Engineering

Course(s):

SAST 111
Provide activities that have students compare and contrast contradictory hypotheses and cite data and/or observations to support one over the other.

SAST 111L
Require students to interpret graphs found in the discipline’s scholarship or other research materials when possible

SBIO 101 & L
Students must interpret graphical information on exams and must read and interpret the peer-reviewed scientific literature.
Students must interpret written research summaries, summarize data and interpret graphs. Students also write lab reports on their experiments in Microsoft Word.

SBIO 102 & L
Students must interpret graphical information on exams and must read and interpret the peer-reviewed scientific literature.
Student must interpret written research summaries, summarize data and interpret graphs. Students also write lab reports on their experiments in Microsoft Word.

SBIO 110 & L
Students will be presented with more short assignments that measures skills such as graph reading, graph design and interpretation of information presented in tables and figures. They will design a hypothesis and write lab report sections from different experiments that they accomplish in laboratory during the semester.

SBIO 206
SLO 2.2 Application of Mendelian and molecular genetics principles to solving problems

SBIO 240
Students are introduced to basic scientific methodology and then must apply the methodology to a variety of bioethical and other biological issues relating to human health and society. They must support conclusions with valid scientific reasoning.

SBIO 242 & L
Students in all physiology laboratories and lectures are going to be exposed to more graph analysis. While most laboratories utilize some graphic analysis, there were inconsistencies among laboratory instructors. Selected laboratory exercises have been reworked to require extraction of data from graphs and graphic representation of collected data. Scenarios using changes to the collected datasets will allow students to formulate hypotheses regarding physiological impacts of the changes.
SBIO 270 (this was taught in 2009 and 2010 entirely by adjunct faculty, recommend having full-time faculty coordinator be assigned for the course)

Students will be required to evaluate graphical historical data and environmental model predictions data to assess trends in the data, given the many opposing viewpoints regarding climate change. Students will compare and contrast multiple viewpoints, and supporting data for each viewpoint, relating to selected environmental issues. This will culminate in a topic presentation that requires discussion of, and supporting/refuting, opposing views using scientific evidence.

SCHM 105
Provide activities that have students discuss proposed hypotheses and the data supporting the hypotheses, evaluating the scientific reasoning in each problem.

SCHM 106
Provide activities that have students discuss proposed hypotheses and the data supporting the hypotheses, evaluating the scientific reasoning in each problem.

SCHM 107L
Require students to use their raw data in lab to identify trends and make predictions.

SCHM 109 & L
SLO 2.1 Data Representation is approached through the problems involving graphical analysis of acid titration curves to determine pK_a’s. This concept is then extended to allow students to make predictions about the effect of pH on protein activity. We use analysis of heart attack frequency vs. length of time taking Vioxx to present students with an example of Conflicting Viewpoints. These components are covered primarily in lecture.

SLO 2.2 Because CHM 109 is taught from a numerical problem solving perspective, we work on SLO 2.2 elements intensively for about 70% of the semester. Level I items are employed in acid-base chemistry (Henderson-Hasselbalch and buffer problems), concentration, dilution, gas law, kinetic, and equilibrium problems (done in lecture and lab). Level II problems are also encountered in equilibrium and kinetics problems, as well as in enzyme kinetics/inhibitor studies (done mostly in lab). Level III Items are encountered in kinetics, equilibrium, and acid-base/pH/pK_a problems. At a higher level these elements are integrated into questions that allow students to analyze the pH dependence of protein activity. Competency in SLO 2.2 elements is currently being evaluated through homework assignments, lab write-ups, and exam questions.

Future plans: SCHM 109 students have previously shown weakness in some areas of graphical interpretation. Historically we have not given graded homework assignments on this topic during the semester, but instead only asked questions in this area on the final exam. For the 2011 year we will start giving graded homework assignments in this area prior to the final exam, and then ask a related (non-identical) question to determine whether the graded homework assignment was effective in helping the students master the logic associated with type of problem.
SCHM 111 & L
Have students interpolate data points from graphical data.

SCHM 112 & L
Provide activities to allow interpretation of data represented in graphs.

SGEL 101
Use more applications and/or scenarios requiring students to translate verbal information to mathematical models (e.g. natural processes such as streamflow or groundwater flow)

SGEL 101L
Provide students with raw data and require them to identify trends and make predictions (e.g. flooding and recurrence intervals)

SGEL 102
Use more applications and/or scenarios requiring students to translate verbal information to mathematical models (e.g studying evolutionary theory fits very well here)

SGEL 102L
Provide students with raw data and require them to identify trends and make predictions (e.g. change through time in body plan…such as change in shell morphology)

SGEL 103
Use more applications and/or scenarios requiring students to translate verbal information to mathematical models (e.g. natural hazards such as earthquakes or volcanoes)

SGEL 103L
Provide students with raw data and require them to identify trends and make predictions (e.g. beach degradation and over-development with Pilkey data)

SGEL 120
Provide activities that have students compare and contrast contradictory hypotheses and cite data and/or observations to support one over the other – focused on physical processes in this region(e.g. gold formation, or some other resource). Importance is to focus on real data and not soft opinions or beliefs.

SGEL 121
Provide activities that have students compare and contrast contradictory hypotheses and cite data and/or observations to support one over the other – focused on earth processes in a national park (e.g. volcanic or hydrothermal activity at Yellowstone). Importance is to focus on real data and not soft opinions or beliefs.

SGEL 123L
Provide students with raw data and require them to identify trends and make predictions (e.g. physical processes in the parks, such as weathering rates, flooding, and/or erosion)
SGEL 131
Provide activities that have students compare and contrast contradictory hypotheses and cite data and/or observations to support one over the other – focused on earth resources (e.g. oil reserves and the Hubbert curve). Importance is to focus on real data and not soft opinions or beliefs.

SGEL 241
Provide activities that have students compare and contrast contradictory hypotheses and cite data and/or observations to support one over the other – focused on environmental issues (e.g. IPCC data on global climate change). Importance is to focus on real data and not soft opinions or beliefs.

SPHS 101
Use more applications and/or scenarios requiring students to translate verbal information to mathematical models

SPHS 101L
Provide students with raw data and require them to identify trends and make predictions

SPHS 201 & L
SLO 2.1 Interactive examples in the electronic text and in the homework problems provide opportunity for students to generate simulated experimental results that must be interpreted. DVD videos of many experimental demonstrations are presented and students must interpret the results.
SLO 2.2 Students are required to solve problems in class, along with many interactive examples in the text, and many homework problems. The majority of testing requires the solution of problems.

SPHS 202 & L
SLO 2.1 Interactive examples in the electronic text and in the homework problems provide opportunity for students to generate simulated experimental results that must be interpreted. DVD videos of many experimental demonstrations are presented and students must interpret the results.
SLO 2.2 Students are required to solve problems in class, along with many interactive examples in the text, and many homework problems. The majority of testing requires the solution of problems.

SPHS 211 & L
SLO 2.1 Interactive examples in the electronic text and in the homework problems provide opportunity for students to generate simulated experimental results that must be interpreted. DVD videos of many experimental demonstrations are presented and students must interpret the results.
SLO 2.2 Students are required to solve problems in class, along with many interactive examples in the text, and many homework problems. The majority of testing requires the solution of problems.
SPHS 212 & L

SLO 2.1 Interactive examples in the electronic text and in the homework problems provide opportunity for students to generate simulated experimental results that must be interpreted. DVD videos of many experimental demonstrations are presented and students must interpret the results.

SLO 2.2 Students are required to solve problems in class, along with many interactive examples in the text, and many homework problems. The majority of testing requires the solution of problems.

Department Chair Signature: Lisa Lever               Date: 1/8/11