Liberal Arts & Sciences, Natural Sciences emphasis

Associate in Arts Degree

Spring 2016

Purpose: These courses emphasize the natural sciences which examine the physical universe, its life forms and its natural phenomena. Students will be able to demonstrate an understanding of the methodologies of science as investigative tools. Students will also examine the influence that the acquisition of scientific knowledge has on the development of the world’s civilizations.

Degree Outcomes:

* *Demonstrate an understanding of the methodologies of each discipline within the natural and physical sciences.*
* *Demonstrate an understanding of basic scientific principles, theories, and laws as well as an awareness of the changing nature of science.*

| **Course**  | **Course SLO** | **Assessment Assignments and/ or Instruments**(direct/indirect, tools used, etc.)  | **Assessment Results:**What did members of your program learn from the assessment of the outcome? Did the assessment work, and if not, what needs to be revised? | **Action Plan:**Based on the assessment results, what changes, if any, are planned to increase student success? When will they be implemented? |
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| ANTHRO 1 |  | Course not taught | Course not taught | Course not taught |
| BIOL 1 | 1. Evaluate comparative anatomy and physiology in living organisms.
2. Apply the scientific method to situations that need evaluation and recommendations.
3. Use inductive and deductive reasoning in any environmental or ecological issue.
4. Compare and classify representative organisms from some kingdoms and discuss their contributions to the habitat.
5. Define general principles in molecular biology, natural selection, and genetics and discuss their contribution to living organisms.
6. Build a basic vocabulary related to biological and scientific terms, and be able to apply them when writing and speaking.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubricsDirect observation of performances, structured practice or drills, “practical” exams, small group work, etc.Capstone projects or final summative assessment | SLO question number 1 5 of 7 students (71%), numbers 2&3 7of 7 students (100%) answered the questions correctly. The average for all 3 questions is 90%. | Results are positive—no changes to be made. |
| BIOL 2 | 1. Apply a basic understanding of fundamental environmental and ecological principles including, but not limited to:
	1. biodiversity (especially as it pertains to the local flora and fauna).
	2. ecosystems and population dynamics.
	3. natural resource use and degradation.
	4. human impacts on the environment including pollution and climate change.
	5. energy and nutrient cycling.
2. describe the interrelationships among the several disciplines of environmental science.
3. analyze how humans have changed the environment and estimate/hypothesize the future impact.
4. develop important critical thinking skills through the evaluation of field and laboratory exercises.
5. identify and implement the principles and procedures used in environmental studies.
6. determine ecosystem health using a variety of biological and physical indicators.
7. apply critical thinking skills and scientific facts to evaluate political, legal and social issues related to the environment.
8. discuss the sources and types of air and water pollution and evaluate various solutions.
9. evaluate current and alternative energy sources.
10. develop and evaluate sustainable practices related to natural resource conservation and environmental health.
11. apply scientific methodology to develop and test hypotheses as they relate to environmental and life science.
 |  | SLO Question # of Responses # Correct Responses % Correct Analysis1 12 12 100% 2 12 5 42% 3 12 2 17% 4 12 11 92% 5 12 2 17% 6 12 6 50% 7 12 11 92% 8 12 3 25% 9 12 1 8% 10 12 7 58% 11 12 2 17% 12 12 8 67%  | Course not offered during this assessment cycle |
| BIOL 10 | 1. Evaluate current scientific literature and examine how the scientific method is employed in biological research.
2. Identify levels of biological organization and apply these concepts to living systems:

By examining anatomical and physiological features.By investigating chemical and energy relationships.1. Assess human impacts on natural systems and critically evaluate solutions to environmental problems.
2. Explore the cellular basis of life through the study of microscopy.
3. Apply the principles of Mendelian genetics to evolutionary theory and human medicine.
4. Recognize the function of DNA and how its discovery has impacted modern science.
5. Classify the wide range of living organisms and identify the evolutionary mechanisms that have impacted this diversity.
6. Recognize the chemical basis of life.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubrics | SLO A:51% of students answered the question correctlySLO B:91% of students answered the first part of the question correctly and 96% answered the second part correctlySLO C:64% of students tested answered the question correctly SLO D:76% of students tested answered the question correctlySLO E:60% of students tested answered the question correctlySLO F:73% of students tested answered the question correctlySLO G:83% of students tested answered the question correctlySLO H:93% of the students tested answered the question correctly | Results are positive—no changes to be made on SLO B, D, F, G, & HConduct further assessment related to the issue and outcomeSLO A, C, and E |
| BIOL 10L | 1. Evaluate current scientific literature and examine how the scientific method is employed in biological research.
2. Identify levels of biological organization and apply these concepts to living systems:

By examining anatomical and physiological features.By investigating chemical and energy relationships.1. Assess human impacts on natural systems and critically evaluate solutions to environmental problems.
2. Explore the cellular basis of life through the study of microscopy.
3. Apply the principles of Mendelian genetics to evolutionary theory and human medicine.
4. Recognize the function of DNA and how its discovery has impacted modern science.
5. Classify the wide range of living organisms and identify the evolutionary mechanisms that have impacted this diversity.
6. Recognize the chemical basis of life.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubrics | SLO A:55% of students answered the question correctlySLO B:100% of students answered the first part of the question correctly and 92% answered the second part correctlySLO C:66% of students tested answered the question correctly SLO D:61% of students tested answered the question correctlySLO E:71% of students tested answered the question correctlySLO F:39% of students tested answered the question correctlySLO G:97% of students tested answered the question correctlySLO H:61% of the students tested answered the question correctly | Results are positive—no changes to be made on SLO B, E, and GConduct further assessment related to the issue and outcomeSLO A, C, D, F, and H |
| BIOL 5 | 1. demonstrate knowledge regarding the process of science and society, microscopy, and the cell
2. identify human body levels of organization and homeostatic mechanisms
3. demonstrate knowledge of the chemical basis of life
4. evaluate scientific literature and current biological achievements
5. apply the principles of genetics to humans and understand the outcome of normal and abnormal DNA
6. demonstrate knowledge regarding the structure and function of the following systems: circulation, digestive, respiratory, urinary, skeletal, muscular, nervous, sensory, endocrine, reproduction, and genetics and evolution
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubricsDirect observation of performances, structured practice or drills, “practical” exams, small group work, etc.Capstone projects or final summative assessment | No class taught during last round of assessments. | NA |
| BIOL 11A | 1. apply the scientific method to design an experiment to test a hypothesis using appropriate controls based on current theories in biology.
2. describe the cell’s structural components and their function.
3. demonstrate how living organisms utilize ATP.
4. analyze the process of meiosis as it relates to biological diversity.
5. recognize how the Hardy-Weinberg equation measures genetic change within a population.
6. apply Darwin's theory of natural selection to genetic variation and its effects on environmental adaptation.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubricsDirect observation of performances, structured practice or drills, “practical” exams, small group work, etc. | SLO A:75% of students tested answered correctly25% of students tested answered incorrectlySLO B:77% of students tested answered the correctly23% of students tested answered incorrectlySLO C:67% of students tested answered correctly33% of students tested answered incorrectlySLO D:75% of students tested answered correctly25% of students tested answered incorrectlySLO E:55% of students tested answered the correctly45% of students tested answered incorrectlySLO F:58% of students tested answered correctly42% of students tested answered incorrectly | Results are positive - no changes to be madeResults are positive - no changes to be madeUse new revised resources and spend more time on topicResults are positive - no changes to be madeUse new revised resources and spend more time on topicUse new revised resources and spend more time on topic |
| BIOL 11B | 1. evaluate the biological sciences through references to historical discoveries and recent contributions;
2. demonstrate knowledge of plant and animal taxonomies as they relate to evolutionary history;
3. compare and contrast functional systems of living organisms and identify how these systems work physiologically together to maintain homeostasis;
4. use inductive and deductive reasoning in any environmental or ecological issue;
5. evaluate scientific literature and current biological advances;
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubrics | SLO A:2 of 18 students failed to meet the expected level of achievement (11%)16 of 18 students achieved the expected level of success (89%)SLO B:1 of 18 students failed to meet the expected level of achievement (6%)17 of 18 students achieved the expected level of success (94%)SLO C:12 of 18 students failed to meet the expected level of achievement (67%)6 of 18 students achieved the expected level of success (33%)SLO D & E:7 of 18 students failed to meet the expected level of achievement (39%)11 of 18 students achieved the expected level of success (61%) | Use new or revised teaching methodsSLOs D & EEngage in professional development about best practices for this type class/activity for SLOs D & E |
| BIOL 20 | 1. Identify the major body systems macroscopically.
2. Identify the major body tissue and cell types microscopically.
3. Use a microscope to identify tissues and cells.
4. Describe the functions of the body systems.
5. Describe functions of the cells and tissues.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubrics | We found that the foundational material for biology 20 was attained in the SLOs. | Results are positive—no changes to be made |
| BIOL 22 | 1. describe the function of each human organ and organ system.
2. explain the cell membrane potential and how it becomes an action potential.
3. describe the cell-to-cell communication.
4. demonstrate the use of the electrocardiograph and identify the components of a normal reading.
5. describe the interactions of the respiratory and excretory systems.
6. demonstrate critical thinking in the evaluation of homeostasis.
 | Item analysis of exams, quizzes, and lab reports | SLO A:82% of students tested answered correctly18% of students tested answered incorrectlySLO B:68% of students tested answered the correctly32% of students tested answered incorrectlySLO C:70% of students tested answered correctly30% of students tested answered incorrectlySLO D:89% of students tested answered correctly11% of students tested answered incorrectlySLO E:76% of students tested answered the correctly24% of students tested answered incorrectlySLO F:78% of students tested answered correctly22% of students tested answered incorrectly | Results are positive - no changes to be madeUse new revised resources and spend more time on topicUse new revised resources and spend more time on topicResults are positive - no changes to be madeResults are somewhat positive - will spend more time on topicResults are positive - no changes to be made |
| BIOL 31 | 1. Perform basic staining and identification techniques allowing them to perform basic identification procedures (i.e., gram stains).
2. Diagram and be able to log genus, species, type of organism, whether it is considered normal flora or not, and its potential as a pathogen.
3. Perform labs which hone critical thinking skills, for example: antibiotic susceptibility allows them to understand that some organisms can be controlled by chemicals and others cannot. In the clinical setting they will be able to evaluate a susceptibility test and understand the effect of certain drugs on specific microorganisms.
4. Diagram and label the schematics and working of an autoclave, mechanics of a microscope, inoculation of sterile agar plates, and identification of microorganisms with biochemical testing.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubricsDirect observation of performances, structured practice or drills, “practical” exams, small group work, etc.Capstone projects or final summative assessment | We learned that there are basic skills for each class that also serves as foundational material for the next class in the recommended course sequence. | Results are positive—no changes to be made |
| CHEM 1A | 1. Collect and analyze data and have reasonable conclusions.
2. Competent knowledge of the periodic table, molecules, and compounds
3. Ability to apply skills to solve chemical problems especially math skills
 | Direct observation of performances, etc.Capstone projects or final summative assessment | Improvement on % scores and close to national averages. For the lab practical scores will be compared to other semesters.The student’s average ACS grade can be compared to those at other institutions. The national average for this ACS final is 53% which is close to the 52% average this class obtained. These results show that this class accomplished SLO 2 and 3 successfully. This semester a new pre-semester exam was used with just 7 questions. The average was 3 out of 7 questions correct as most of these students had taken CHEM3A or high school chemistry before taking this course (as recommended). The students improved form an average of 43% on the pre-semester quiz to an average of 75% on the post-semester quiz. At the end of the semester, **81%** of the students passed and they had a satisfactory knowledge of chemistry and skills for SLO 2 and 3. Last semester 80% of the students passed the course. The students at Reedley College start the semester with a much lower knowledge of chemistry than the national average according to the average for the Toledo exam given in Fall 2010 and Spring 2011(Average 30% and 36% and the national average is 53%). We should continue to encourage our students to take CHEM3A or CHEM10 before taking CHEM1A. The titration lab practical averages average was a little better than last semester, but still lower than Fall 2010 and Spring 2011. 84% of the students passed the lab practical so completed SLO 1 successfully. Last semester 87% passed the lab practical. A rubric for grading the lab practical has been developed and so the students should get an average of 85% from now on. The rubric for the Fall 2010 and Spring 2011 semesters gave too high an average.  | Conduct further assessment related to the issue and outcomeUse new or revised teaching methodsPlan purchase of new equipment or supplies needed for modified student activitiesNext semester the same pre-semester quiz and a similar post-semester quiz will be used, as well as the national ACS exam.  |
| CHEM 1B | 1. Solve and explain chemical kinetics and mechanisms problems;
2. Solve and explain chemical equilibrium questions including but not limited to acid/base and pH concepts;
3. Solve and explain problems on thermodynamic concepts;
4. Solve and explain problems on electrochemical concepts;
5. Explain the fundamental concepts of nuclear chemistry;
6. Demonstrate general chemistry skills in the laboratory including qualitative analysis.
 | Item analysis of exams, quizzes, problem sets, etc | Improvement of correct answers on post course assessment over pre course assessment Chem 1B correct pre-class 6 1 1post-class 6 3.2 3.6  | Results are positive—no changes to be madePlan purchase of new equipment or supplies needed for modified student activitiesEngage in professional development about best practices for this type of class/activityRevise the course syllabus or outline |
| CHEM 3A | 1. Use dimensional analysis to solve for an unknown parameter of density, volume, mass, pressure, temperature, molar mass, concentration, or an empirical formula.
2. Construct and balance a chemical reaction and use the reaction to predict stoichiometric quantities.
3. Explain concepts from the periodic table and the use the periodic table to solve chemical problems.
4. Describe acid-base reactions and how to calculate pH.
5. Name and draw Lewis diagrams of inorganic and molecular compounds from the formula and vice versa.
6. Safely conduct laboratory experiments implementing concepts and principles learned in lecture.
 | Item analysis of exams, quizzes, problem sets, etc. | Scores close to national averages.The difference between the weighted percent score for the Madera and Oakhurst Centers and the national average is +1.6%. This means that the Madera Oakhurst students are doing better on the standardized final exam than the nation as a whole.  | Results are positive—no changes to be madePlan purchase of new equipment or supplies needed for modified student activitiesPlan purchase of new equipment or supplies needed for modified student activitiesRevise the course syllabus or outline |
| CHEM 3B | 1. Demonstrate structural formula--name conversions for less complex organic and biochemical compounds.
2. Describe physical properties of organic compounds.
3. Predict products of representative chemical reactions.
4. Explain basic concepts of biomolecules, such as carbohydrates, lipids, proteins, enzymes, and nucleic acids.
5. Safely demonstrate laboratory experiments involving basic organic chemistry and biochemical themes.
 | Direct observation of performances, etc.Capstone projects or final summative assessmentPre-post test | 87.5% of the students showed an improvement from the pretest to the final exam.  | Results are positive—no changes to be madeUse new or revised teaching methodsPlan purchase of new equipment or supplies needed for modified student activities |
| CHEM 8 | 1. Draw a structural formula of an organic compound given the systematical name.
2. Analyze the structural formula of an organic compound, recognize its functional groups and name it properly.
3. Identify S and R stereoisomers.
4. Complete the reactions of simple aliphatic and aromatic molecules, showing the reaction mechanisms.
5. Analyze simple IR and NMR spectra to determine the structure of an unknown compound.
 | Item analysis of exams, quizzes, problem sets, etc. | The average number of questions correct is 29.4 which is 0.12 questions different than the national average of 29.52. Both the class percentage 49.0% and the national average 49.2% are very similar.  | Results are positive—no changes to be madePlan purchase of new equipment or supplies needed for modified student activitiesRevise the course syllabus or outline |
| CHEM 9 | 1. Follow step wise instructions for the reactions of simple aliphatic and aromatic molecules and practice writing correct reaction mechanisms of substitution reactions.
2. Handle organic compounds and ground glassware safely.
3. Analyze organic compounds by obtaining the melting points, refractive indexes, infra-red spectra, gas chromatograms and nuclear magnetic resonance spectra.
4. Draw structural formulas and line-bond formulas given the systematical name of an organic compound.
5. Analyze the structural formula of an organic compound, recognize its functional groups and learn how to name it properly using the systematical IUPAC nomenclature.
6. Recognize stereochemistry by identifying asymmetric carbon atoms that cause chirality.
 | Course not offered during this assessment cycle. | Course not offered during this assessment cycle. | Course not offered during this assessment cycle. |
| CHEM 10 | 1. Demonstrate a working knowledge of the periodic table in such ways as deriving inorganic chemical formulas and balanced chemical equations.
2. Write the name of inorganic and molecular compounds from the formulas.
3. Use dimensional analysis and stoichiometry to solve for an unknown parameter of density, volume, mass, pressure, temperature, molar mass and concentration.
4. Apply the definition of acids and bases and explain the concept of pH.
5. Apply basic safety procedures in the chemical laboratory and demonstrate laboratory skills in the use of analytical balances, following experimental procedures and the proper handling of glassware.
 | Item analysis of exams, quizzes, problem sets, etc | •The average score on the pretest was 21% with no one achieving 70% or higher. •The average on the final SLO assessment was 57% with 45% of the students achieving 70% or higher. •95% of the students (21 of 22) improved their score from the pretest to the final SLO assessment. •71% of those who passed the class (10 of 14) also passed the final SLO assessment.The assessment shows that all but one of the students learned something during the semester while only 45% of the students demonstrated proficiency at the end of the semester. The assessment works | Revise the course sequence or prerequisites |
| CHEM 28A | 1. analyze the structural formula of an organic compound, recognize its functional groups and name it properly.
2. draw a structural formula given the systematical name of an organic compound.
3. recognize stereochemistry and describe the physical properties of chiral compounds.
4. complete the reactions of many aliphatic molecules and write the correct reaction mechanism.
5. analyze MS, IR and NMR spectra and determine the structure of an unknown compound.
 | Item analysis of exams, quizzes, problem sets, etc. | In fall 2010 the class average grade was 79.6%; in fall 2011 the result was 74.9%. I plan on revising some of my fall worksheets, although the overall class result in fall 2011 was high with a success rate of 83%.  | Results are positive—no changes to be madeUse new or revised teaching methods |
| CHEM 28B | 1. predict the products of reactions of aromatic compounds.
2. draw the reaction mechanism of an electrophilic aromatic substitution.
3. complete reactions involving the carbonyl functional group such as aldehydes, ketones and carboxylic acids.
4. recognize bio-molecules such as carbohydrates, lipids, amino acids, proteins and nucleic acids.
5. explain how DNA sequencing takes place and what its role is in the current developments in biochemistry.
 | Item analysis of exams, quizzes, problem sets, etc. | In spring 2012 the class average grade was 74.0%; with the same group in fall 2011 the result was 74.9%. I plan on revising some of my worksheets to better prepare the students for quizzes and exams. The overall class result this academic year was 77.4% with 24 out of the 31 students passing the class. 8 students scored an A.  | Results are positive—no changes to be madeResults are overall positive—slight changes will be made though Use new or revised teaching methods |
| CHEM 29A | 1. read and follow instructions in an organic laboratory manual, safely handling organic chemicals and glassware with ground-glass joints.
2. determine physical properties of organic compounds such as melting point and refractive index.
3. synthesize simple organic compounds such as but not limited to cyclohexene, t-butylchloride, alcohols and acids.
4. analyze organic molecules using a gas chromatograph and infrared spectrometer and interpret the spectra.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubricsDirect observation of performances, etc.Student self-assessments | SLO 1: The students performed the experiment in a safe and efficient manner, learning how to set up and conduct distillations, extractions, reflux reactions, re-crystallization and analyses of the products. The students also learned how to fuse organic compounds to sodium so that unique analyses may be conducted. SLO 2: Analysis of the compounds was graded for each lab report. Analytical technique labs were also graded and a satisfactory grade was 70%. SLO 3 and 4: Lab reports and the analysis of the products were graded. A satisfactory grade for these lab reports would be 70%. All SLOs: 29 out of 30 students (97%) achieved these student learning outcomes successfully for this semester.  | Results are positive—no changes to be madeDevelop new methods of evaluating student work Plan purchase of new equipment or supplies needed for modified student activitiesTwo lab quizzes will be used in Fall 2012 to assess the students individual understanding of the experiments. The students will be allowed to use their laboratory notebooks, but no textbooks.  |
| CHEM 29B | 1. synthesize, isolate, and purify a variety of organic molecules, such as esters, aldehydes, ketones and aromatics, following instructions in a laboratory manual and adhering to safety protocols.
2. analyze organic compounds using instrumentation such as gas chromatography, infrared spectrophotometry (IR), melting point apparatus, refractometry, polarimetry, and nuclear magnetic resonance spectroscopy (NMR).
3. perform experiments on a variety of biomolecules such as carbohydrates, amino acids and lipids.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubricsDirect observation of performances, etc.Student self-assessments | SLO 1: The students performed the experiment in a safe and efficient manner, calculated the percent yield, analyzed the product, wrote a report and answered some questions on the reaction. SLO 2: Analysis of the compounds is graded for each lab report. Analytical technique labs were also graded and a satisfactory grade would be 70%. SLO 3: Lab reports for the qualitative tests were graded and an unknown compound was identified. A satisfactory grade for these lab reports would be 70%.  All SLOs: 24 out of 26 students (92%) achieved these results successfully for this semester which is slightly lower than 19 out of 20 students (95%) for Spring 2011. One student didn’t turn in most of his lab reports and another student gave up towards the end of the semester. | Results are positive—no changes to be madeDevelop new methods of evaluating student work Plan purchase of new equipment or supplies needed for modified student activitiesThis class is offered in the Spring so the next assessment will be completed during Spring 2013 and the results compared to these results.Two lab quizzes will be used in Spring 2013 to assess the students’ individual understanding of the experiments. The students will be allowed to use their laboratory notebooks, but no textbooks.  |
| GEOG 5 | 1. identify the basic elements of and processes that produce the earth’s weather, climates, and natural vegetation regions.
2. analyze and solve problems in physical geography, including those requiring computation.
3. describe the pattern of climate and vegetation regions on the earth.
 | Item analysis of exams, quizzes, problem sets, etc. | The assessment worked. A couple of teachers had classes that performed below the expected results. These results will be discussed next semester and the instructors will focus on their teaching strategies.  | Use new or revised teaching methodsAll instructors will continue to improve teaching methods to improve learning outcomes.  |
| GEOG 9 | 1. identify the basic elements of and processes that produce the earth’s landforms.
2. analyze and solve problems in physical geography, including those requiring computation.
3. explain the global process of plate tectonics.
4. describe the major forces of denudation on the earth’s surface.
 | Item analysis of exams, quizzes, problem sets, etc. | The assessment showed that success was achieved for this SLO. Students averaged greater than 80% correct answers for the three questions analyzed.  | Results are positive—no changes to be made |
| GEOL 1 | 1. Differentiate common rocks and minerals
2. Understand the theory of plate tectonics and formulate an hypothesis as to how it is responsible for shaping the surface of the earth
3. Illustrate on topographic maps, aerial photographs, and earth satellite images the most common locations of earthquakes
4. Compare and contrast how and where different types of rocks are formed (igneous, sedimentary and metamorphic rocks)
5. Organize geologic hazards such as earthquakes, volcanism, flooding, and landslides into specific groups and compare their origins
 | Item analysis of exams, quizzes, problem sets, etc.Lab activities | The students generally did well and showed improvement. I am planning to incorporate weekly quizzes, more hands on activities in labs | Use new or revised teaching methodsAssigned a topic or concept from the book in advance to each student and have them give an explaination to the class in lecture.Updated quizzes, lab activities and topics for weekly experts should be completed before the Fall 2012 semester begins. |
| GEOL 2 | 1. Understand the concept of geologic time and how it is measured and then apply this information to interpret specific changes in the biologic and geologic record
2. Critique theories on how life on earth has evolved
3. Classify rock and fossils and their relationship to the geologic record.
4. Apply plate tectonic knowledge to a discussion on earthquakes.
 | Course not offered during this assessment cycle | Course not offered during this assessment cycle | Course not offered during this assessment cycle |
| GEOL 9 | 1. Apply the scientific method in problem solving across numerous disciplines.
2. Differentiate among the major earth systems and show how the systems interconnected.
3. Distinguish among many rocks and minerals per scientific methodology.
4. Compare and contrast the rock and hydrologic cycles.
5. Assess the status of the earth’s natural resources.
6. Critique the evidence of continental drift and plate tectonics.
7. Integrate the plate tectonics theory in explaining distribution of the earth’s major topographic features and in the distribution of the earth’s active geology (i.e.,, volcanoes, earthquakes, etc.)
8. Integrate the major landform-producing/shaping processes in explaining the type, and shape of, the earth’s myriad landforms.
9. Interpret the geologic history of a landscape using the major geologic principles and the concept of geologic time.
10. Interpret and evaluate geologic, topographic, and weather maps.
11. Determine climate types via interpretation of weather data.
12. Forecast weather patterns via analysis of atmospheric data.
13. Critique theories on the origin of the universe.
 | Item analysis of exams, quizzes, problem sets, etc.Lab activities | The assessments did work but I think that there is a need for weekly quizzes and more hands on activities in labs. | Use new or revised teaching methodsNew quizzes and lab updates should be completed before the start of the spring 2013 semester. |
| GEOL 10 | 1. Distinguish common rock forming minerals, common ore minerals, common rocks and common fossils, concentrating on invertebrate fossils.
2. Compare and contrast the principles of crystallography and fossilization.
 | Course not offered during this assessment cycle | Course not offered during this assessment cycle | Course not offered during this assessment cycle |
| NR1 | 1. Compare the difference between multiple use and preservation management.
2. Prepare equipment for safe operation to fell and buck trees.
3. Explain specified public and private timber resource entities' authority in the management of natural resources in the United States.
 | Direct observation of performances, etc. | Assessment worked. Tool is adequate for assessing student learning with 70% of class achieving objective. | Results are positive—no changes to be made Student success was within guidelines. Student success with assessment tool reflected overall student success in the course. Poor attendance was reflected in falling below the guideline for success. |
| NR4 | 1. identify tree species and ecosystem components to properly respond to management directives in the field.
2. interpret scientific data and analysis, demonstrating understanding of the relevant scientific literature
3. demonstrate understanding of biological or environmental factors that affect forest growth and development
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubrics | Assessment worked. Tool is adequate for assessing student learning at 70%. | Results are positive—no changes to be made Student success was within the guidelines. Student attendance had an effect on learning outcomes; poor attendance was reflected in falling below the guideline for success. |
| NR 6 | 1. Define and distinguish between common forest community types of the Western United States.
2. Determine basic ecological requirements of common forest trees.
3. Differentiate between species with similar morphology.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubricsDirect observation of performances, etc. | Assessment worked. Tool is adequate assessing student learning, with 70% of class achieving objective. | Results are positive—no changes to be made Student success was within guidelines. Student attendance had an effect on learning outcomes; poor attendance was reflected in falling below the guideline for success.  |
| NR7 | 1. Assess human impact on the environment.
2. Recognize ecological inter-relationships, biotic and abiotic components.
3. Analyze social issues, correlate those issues to ecological principles, and hypothesize long term results.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubrics | Assessment worked. Tool is adequate for assessing student learning of 70%. | Results are positive—no changes to be made Student success was within the guidelines. Student attendance had an effect on learning outcomes; poor attendance was reflected in falling below the guideline for success. |
| NR 14 | 1. Differentiate several wildlife management concepts and select an appropriate one when given a set of criteria.
2. Identify western mammals, birds, and fish and discuss the basic habitat requirements.
3. Identify species of wildlife through the use of track plate surveys.
 | Item analysis of exams, quizzes, problem sets, etc.Assignments based on rubricsDirect observation of performances, etc. | Assessment worked. Tool is adequate for assessing student learning of 70%. | Results are positive—no changes to be made Student success was within the guidelines. Student attendance had an effect on learning outcomes; poor attendance was reflected in falling below the guideline for success. |
| PHYS 2A | 1. Apply algebra and trigonometry to solve physical problems in topics such as:
	* Kinematics
	* Vector quantities
	* Newton’s Laws
	* Conservation of energy and momentum
	* Rotating bodies
	* Gravity
	* Oscillatory motion
	* Mechanical waves
	* Heat and Temperature
	* Thermodynamics
2. Apply knowledge in the areas of mechanics, properties of matter, heat, sound and waves in other science related courses.
 | Item analysis of exams, quizzes, problem sets, etc.Physics lab | There are total of 22 students enrolled in fall 2011 and took the final exam. Learning outcome A, D, E, and G were assessed in written final exam. Learning outcome B and C were assessed in the physics labs.Vector addition: 27% of the students received 3 or better. Vector component: 91% of the students answer the multiple choice correctly. 72% of the students answered the question correctly.23% of the students received 3 or better. 91% of the student answered the question correctly. 90% of the students received 3 or better.90% of the students received 3 or better. | Results are positive—no changes to be madeConduct further assessment related to the issue and outcomeUse new or revised teaching methodsTwo questions were used to assess SLO A. One is a multiple-choice question, the other is a word problem. The result from work problem is very different from the result of multiple-choice problem. Again, a word problem was used to assess SLO E; and result is below standard.There are two possible reasons for low score when a word problem is used. First, students are weak in problem solving skills. More problem-solving sessions will be used to improve students’ problem solving skills. Second, the word problems given were not basic problems. There were level II and level III problems. Evaluation questions will be reviewed and revised. |
| PHYS 2B | 1. Apply algebra and trigonometry to solve physical problems in the following topics:
	* Electrostatics
	* Electric Fields
	* Electric Potential
	* Capacitance
	* Electric Circuits
	* Magnetism
	* Electromagnetic Induction
	* Electromagnetic waves
	* Optics
	* Modern Physics
 | Item analysis of exams, quizzes, problem sets, etc.Physics lab | There are total of 7 students enrolled in spring 2012 and took the final exam. Learning outcome A and B were assessment in written final exam. Learning outcome C, D, and E were assessed in the physics labs.. A.1 5 of the 7 students (71%) received 3 or betterA.2 4 of 7 students (57%) of the students received 3 or betterB.1 6 of the 7 students (86%) received 3 or betterB.2 4 of the 7 students (57%) received 3 or betterLab 100% of the students received 3 or betterLab 100% of the students received 3 or betterLab 100% of the students received 3 or better | Results are positive—no changes to be made |
| PHYS 4A | 1. Apply algebra, trigonometry, and first-year calculus to solve physical problems such as:
	* Kinematic equations
	* Vector quantities
	* Newton’s Laws
	* Conservation of energy and momentum
	* Rotating bodies
	* Gravity
	* Oscillatory motion
	* Mechanical waves
2. Identify the complementary roles of experimental investigation and theoretical explanation in science.
3. Apply dimensional analysis to determine the units for an unknown quantity or to check the validity of equations.
4. Correctly report the units of an observable when it is measured or calculated.
5. Distinguish between important physical observables, such as mass and weight or speed and velocity.
 | Item analysis of exams, quizzes, problem sets, etc | 96 % success | Results are positive—no changes to be made |
| PHYS 4B | 1. apply basic concepts and fundamental laws in thermodynamics, electricity, and magnetism.
2. solve problems in thermal expansion.
3. differentiate the heat transfer mechanisms of conduction, convection, and radiation.
4. apply the First Law of Thermodynamics.
5. understand the relationship between temperature and molecular kinetic energy.
6. apply basic concepts and fundamental laws in electricity and magnetism.
7. calculate the electric potential of various charge configurations.
8. relate electric field and electric potential.
9. determine the capacitance of various electrical systems.
10. solve basic problems involving electrical circuits.
 | Item analysis of exams, quizzes, problem sets, etc. | 88% success | Results are positive—no changes to be made |
| PHYS 4C | 1. Solve problems that are applied to the theory of Maxwell’s Equations of electromagnetism.
2. Solve problems that are applied to the theory of basic concepts of relativity and quantum theory.
3. Solve problems that are applied to the theory of basic concepts of atomic and nuclear interactions
4. Solve problems that are applied to the theory of basic concepts of condensed matter physics.
 | Item analysis of exams, quizzes, problem sets, etc | 98% success | Results are positive—no changes to be made |
| PHYS 10 | 1. Describe what physics is, what natural phenomena are explained by the science of physics, and what physicists study;
2. Identify the basic physical laws of nature;
3. Apply theory and experiment to scientific inquiry;
 | Item analysis of exams, quizzes, problem sets, etc | 65% success of 70% benchmark | Use new or revised teaching methodsDevelop new methods of evaluating student workReword the questions. Discussion with students revealed that they misunderstood what was being asked. |
| PHYS 30 | 1. Recognize and use new vocabulary words specific to physical science.
2. Demonstrate college level communication skills both written and verbal as they apply to technological information. This skill could be applied, for example, in the selection of products or services in our technologically advanced society.
3. Recognize and manipulate graphs and mathematical problems as they relate to physical science topics as they appear in periodicals and books.
 | Course not offered during this assessment cycle. | Course not offered during this assessment cycle. | Course not offered during this assessment cycle. |
| PLS 1 | 1. locate and explain the functions of plant cells, tissues and organs.
2. explain the effects of specific techniques and materials on plant growth, development, photosynthesis, and reproduction.
3. describe the effects of plant science practices on ecosystems and society.
 | Item analysis of exams, quizzes, problem sets, etc.Direct observation of performances, etc. | The level of achievement that was used for the determination of success was 73%. This level may be adjusted as assessments are developed and implementedThe measured level of for SLO A was 70% The measured level of for SLO B was 72% The measured level of for SLO C was 72% | Results are positive—no changes to be madeConduct further assessment related to the issue and outcomeUse new or revised teaching methodsDevelop new methods of evaluating student workPlan purchase of new equipment or supplies needed for modified student activitiesRevise the course sequence or prerequisitesRevise the course syllabus or outline |
| PLS 1L | 1. identify, illustrate and explain the functions of plant tissues and organs.
2. explain the roles of essential elements in plants and describe the defiencty symptoms associated with these elements.
3. demonstrate the basic practices in propagation and prunimg.
 | Item analysis of exams, quizzes, problem sets, etc.Direct observation of performances, etc. | The level of achievement that was used for the determination of success was 70%. The measured level of for SLO A was 80%. The measured level of for SLO B was 85% | Results are positive—no changes to be madeConduct further assessment related to the issue and outcomeUse new or revised teaching methodsDevelop new methods of evaluating student workPlan purchase of new equipment or supplies needed for modified student activitiesRevise the course sequence or prerequisitesRevise the course syllabus or outline |
| PLS 2 | 1. analyze the various components of soil and summarize the essential, beneficial, and detrimental impacts on the micro to macro scales of influence.
2. describe, illustrate, and identify physical, chemical and biological properties of soil and processes within soils.
3. utilize quantitative and qualitative skills in measuring soil properties, and prescribe effective countermeasures to improve soil quality or mitigate detrimental characteristics.
 | Item analysis of exams, quizzes, problem sets, etcAssignments based on rubrics.Direct observation of performances, etc. | The level of achievement that was used for the determination of success was 70%. This level may be adjusted as assessments are developed and implemented.The measured level of for SLO A was 76% The measured level of for SLO B was 81% The measured level of for SLO C was 72% | Results are positive—no changes to be madeConduct further assessment related to the issue and outcomeUse new or revised teaching methodsDevelop new methods of evaluating student workPlan purchase of new equipment or supplies needed for modified student activitiesRevise the course sequence or prerequisitesRevise the course syllabus or outline |
| SCI 1A | 1. Explain basic theory and use appropriate terminology for fourteen different major areas in physics and chemistry.
2. Apply scientific principles and laws from physics and chemistry to the solution of problems of increasing complexity.
3. Interpret, analyze, and mathematically model physical and chemical phenomena observed in the laboratory.
4. Design and implement laboratory exercises that demonstrate and elucidate concepts in physics and chemistry.
5. Explain common misconceptions in physical science and give the correct interpretation of these concepts.
 | Item analysis of exams, quizzes, problem sets, etcAssignments based on rubrics.Direct observation of performances, etc.Classroom Assessment TechniquesCapstone projects or final summative assessment | Reporting fall 2012 | Reporting fall 2012 |
| SCI 3 | Course deleted | Course deleted | Course deleted | Course deleted |

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