
AET/515
Northwest Valley
Community College
General Chemistry
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Needs Assessment

1. What is the learning problem or opportunity?

The community has several companies and organizations that use various chemicals on a regular basis for routine tasks.

2. What is currently available?

Currently there is no undergraduate chemistry classes available in the community.

3. What should be available?

A basic level chemistry class that addresses the basic properties and reactivity of common chemicals and how to safely work with them.

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4. Explain the gap analysis between what is available and what should be available.

Employers can ensure proper safety techniques for handling, using, and disposing of chemicals if employees have a basic understanding of the purpose and importance of these procedures. Employees who do not have a basic understanding of how to properly use and dispose of chemicals pose a health and safety threat to themselves, the people they work with and the environment.

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5. What is your recommended solution for filling the gap?
Having a basic chemistry course available at Northwest Valley Community College will provide employers with an option to properly train and educate employees to ensure a safe working environment and prevent environmental damage from improper disposal.
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Instructional Goal

General chemistry students will be able to identify properties, reactivity, safety concerns and proper disposal techniques of commonly used chemicals using print and online resources and apply the learning in laboratory experiments.

Performance-Based Objectives

By mid-semester General Chemistry students will be able to identify the reactivity and properties of common chemicals with 90% accuracy.

By the end of the semester General Chemistry students will be able to explain and demonstrate safe handling and disposal procedures of common chemicals with 100% accuracy.

Summative Assessment and Learning Outcomes

General Chemistry students will display understanding of the reactivity and properties of common chemicals through assigned practice problems and weekly assessments. They will demonstrate proper handling techniques and disposal procedures by successfully completing laboratory experiments.

Learner Characteristics

The General Chemistry class will consist of 20 students, 12 female and 8 male. Each student will have a high school diploma or equivalent. Students range from high school graduate to having had 20 years of experience in their field. A kinesthetic approach meets the majority of the students needs.

With this diverse group lessons will need to incorporate real life examples that allow students to build upon personal experiences in the home or on the job. Students will need to be partnered in the laboratory with complimentary learning styles and needs.

Learning Context

Students will learn chemical theory and principles in the classroom using recommended text, online tools and instructor facilitated discussion and demonstration based on the weekly readings. They will apply chemical theory and principles from the classroom in the laboratory using predesigned experiments that utilize common chemicals and laboratory equipment.

Successful completion of classroom discussion and laboratory experiments will allow students to apply new knowledge to safely use and dispose of chemicals at home or at work.

To ensure safe use of common chemicals at home and work all classroom discussion and laboratory experiments will be completed using everyday items that students would use at home or in a work environment.

Delivery Modality

Instruction will be given in two parts. Students will attend classroom instructor led sessions that will incorporate group discussions based off of the text material and personal experiences. A synchronous learning environment will also be used in the laboratory setting where students will work with a lab partner to complete the experimental task based off of the weeks text and classroom discussion. Asynchronous learning will be utilized in the preparatory work for the laboratory experiment. Students will need to utilize additional resources on line or in print to answer background questions for the experiment, predict outcomes of the experiment and outline proper handling procedures of the chemicals being used.

Instructional Strategies

- In the general chemistry for non science major class the students need to learn about how chemicals react and classify common chemicals by their properties. Students will learn the difference between acids and bases, the concept of ionization and reactivity, and safety and environmental concerns of everyday chemicals. Students will be required to read assigned text to prepare for classroom discussion. Through the course of the discussion the instructor will explain the background of common chemicals and ask for learners to share relevant examples from their lives in how they have used these chemicals what their observations were when using them. Students will then work with their lab partner to discover available resources on how to use and properly handle these chemicals as preparatory work for their laboratory experiment. They will also be required to use their resources on line and in the text to predict outcomes of the laboratory experiment prior to attending the laboratory session for the week. The instructor will demonstrate the experiment using safe handling and disposal procedures so that students have an understanding of what is expected of their activities in the laboratory.
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- Students will gain an understanding of a concept such as the properties of acids through assigned reading from their text book. The instructor will then discuss the concept and provide further details related to the concept. The instructor will facilitate class discussion by asking students to share experiences that they have had using this type of chemical and what they observed while using it, for example they may discuss using lemons for dietary, health and beauty or household purposes. The students will build upon their classroom discussion by experimenting with the type of chemical that they discussed such as analyzing if it is the lemon or its juice that contains the acidity that kills odor causing bacteria in the kitchen. Through this process the students will gain an understanding of how chemicals are used in their everyday lives and the importance of using them correctly to ensure safety. An overview of chemical properties and reactivity rather than detailed specifics of elemental properties and reactivity will achieve the base line knowledge for safe chemical handling practices.
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Plan for Implementation

- The general chemistry course for non science majors will be conducted through 16 week semester. The class times will consist of two hours of instructor facilitated learning in the class room for two hours on Tuesdays and two hours of laboratory experiments on Thursdays. Students will be able to enroll in the course for fall or spring semesters.
 - The class will consist of one instructor and the twenty students. They will use the prescribed text for the basis of facilitated discussion. Access to a white board and desks or tables will be required in the classroom. They will also need to utilize other print materials and on-line resources of reputable information as described in the syllabus for laboratory pre-work. A laboratory experiment text book utilizing experiments with common chemicals will be used as the bases for the students experimental learning. Students will need to provide a bound composition book to record the results of their laboratory experiments in as well as goggles and a chemical safety apron.
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- In order for the general chemistry course to be successful the science department chair and chosen instructor will need to meet to develop curriculum for approval by the board. Classroom instruction can take place in an already existing classroom can be utilized for the facilitated discussion while a basement classroom in the current building will need to be retrofitted with exhaust hoods, laboratory benches with access to water and gas lines at each station. A total of 10 stations will need to be constructed. Once a classroom is retrofitted for a chemistry laboratory and curriculum has been developed the class will be available for students starting the spring semester of 2013 and continuing every fall and spring semester afterwards. We can add the course to the catalog for the 2012-2013 year and advertise it's availability on mailers, the schools website and newsprint already used for such purposes for other courses. Students will be enrolled in the class as a first come first serve basis as long as they are a student of Northwest Valley Community College and meet the minimum requirement of a high school diploma or an equivalent.

Instructional Resources

The classroom will need a white board and desks or tables for the learners to sit at. A projector that can display computer screens would be beneficial as well. The laboratory will need to be stocked with glassware, burners, fume hoods, work stations with access to water, universal chemical absorption agents as well as an assortment of common chemicals including but not limited to: lemons, lemon juice, vinegar, baking soda, detergent, cooking oil, bleach, soap, ammonia, and salt.

Formative Assessment

- Formative evaluations will be conducted by the department chair and instructor to insure subject material is accurate and appropriate for the target audience throughout the designing of the material.
 - Laboratory experiments will be piloted with local high school students as part of their participation in the Science Olympiad contest in the fall to determine ease of understanding and applying the materials.
 - Reviews by instructors already facilitating this course type in other institutions will be sought once the initial design is completed.
 - Once the course is being facilitated the instructor will be asked to review each unit upon its completion for accuracy and relevancy.
 - Once the course is being facilitated the students will be asked to review each unit upon its completion for its ease of understanding and application.
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Evaluation Strategies

A number of techniques will be used to determine the effectiveness of the instructional plan. Prior to launch each unit will be reviewed by the instructor and department head to determine if the material is accurate meeting the objectives through a survey and verbal feedback. Once the initial design is complete it will be reviewed by subject matter experts at other institutions with similar courses with verbal and survey feedback. To test the understandability of the lab work the labs will be administered during this fall's Science Olympiad. The ability for the students to complete the labs successfully with accurate results will provide empirical data for the understandability and accuracy of the designed labs. Students and the instructor will complete surveys with verbal feedback at the end of each unit to determine accuracy and understandability of the material. The overall grade results of the students at the end of the semester will provide further empirical data measuring the success of the design.

Outcome Review

All surveys will be two part, first they will use a Likert scale and secondly allow for verbal comments. A grading rubric will be designed for laboratory reports to determine that the criteria and objectives for the unit have been met. A scoring guide will be used for the final assessment that will consist of multiple choice, short answer and essay questions.

Recommendations

Modifications to the units to better meet the needs of the learner through the delivery process will be completed as feedback is reviewed and analyzed. The laboratory experiments will be modified to utilize available materials and make processes easier to follow based on results from the grading rubric and survey process.

References

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