GROSSMONT COLLEGE

COURSE OUTLINE OF RECORD

Curriculum Committee Approval: 11/30/2021

GCCCD Governing Board Approval: 12/14/2021

CHEMISTRY 113 - FORENSIC CHEMISTRY

1. Course Number Course Title Semester Units

CHEM 113 Forensic Chemistry 4

Semester Hours

3 hours lecture: 48-54 hours 96-108 outside-of-class hours 3 hours lab: 48-54 hours

192-216 total hours

2. Course Prerequisites

A “Pass” grade in MATH 090 or equivalent or appropriate mathematics placement.

Corequisite

None

Recommended Preparation

None.

3. Catalog Description

Elementary principles of inorganic and general chemistry with application to the field of criminal justice. Students will learn basic chemical terminology, problem solving techniques and chemical explanations of our environment. Emphasis will be placed on forensic applications of topics covered, including the study of physical evidence such as hair, fibers, glass, fingerprints, and paint. Organic and inorganic techniques for analyzing evidence will be studied in lecture and practiced in lab. Previous chemistry background is helpful, but not required. This course is recommended for students needing a one semester general chemistry laboratory course. This course does not satisfy the prerequisite for Chemistry 141. Students will not receive credit toward graduation for more than one of the following courses: Chemistry 113, Chemistry 115, and Chemistry 120.

4. Course Objectives

The student will:

a. Identify, categorize, and name a variety of chemical compounds based upon their chemical formula.

b. Write, balance, and interpret chemical equations.

c. Analyze problems to identify data, unknown value, and determine an appropriate method of solution.

d. Utilize unit dimensional analysis to solve a variety of chemical conversion problems.

e. Describe atomic structure, periodicity and molecular structure in terms of subatomic particles.

f. Explain chemical phenomena in molecular terms.

g. Perform and analyze chemical experiments in the laboratory.

h. Apply the skills given in the above objectives to critically evaluate the applied areas of the course as given in the course content list.

5. Instructional Facilities

a. Standard classroom.

b. Wall mounted Periodic Chart.

c. Facilities for lecture demonstrations, including a lecture table with gas, air, water, vacuum and sink.

d. Individual student drawers containing standard laboratory equipment including, but not limited to, beakers, Erlenmeyer flasks, graduated cylinders, filter flasks, Buchner funnels, glass funnels, pipets, test tubes, test tube racks, glass sample vials, drying tubes, and assorted scoopulas, stir rods, and spatulas.

e. Laboratory classroom including but not limited to drying ovens, pH meters, fume hoods, hot plates, magnetic stir plates, triple beam balances, analytical balances, Bunsen burners, and microburners, melting point apparati, IR spectrometer, GC, oil baths and resistance heaters, and UV vis spectrometer.

6. Special Materials Required of Student

a. Scientific calculator with exponential and logarithmic functionality.

b. Approved safety glasses or goggles.

7. Course Content

a. Units and conversions, metric system, density.

b. Elements, compounds and formulas.

c. Atomic structure and the periodic table.

d. Chemical bonding.

e. IUPAC nomenclature.

f. Chemical reactions, stoichiometry.

g. States of matter, gas, liquid, and solid properties.

h. Solution chemistry acids and bases.

i. Oxidation and reduction reactions, applied to fire and explosives.

j. Organic and nuclear chemistry.

k. Forensic applications such as hair, fibers, glass, fingerprints, photography, paint, drugs, soils and minerals.

l. Theory behind, and practical experience involving as many of the following analytical techniques as possible: spectrophotometry, microscopy, gas/liquid chromatography, thin layer chromatography, mass spectroscopy, emission spectroscopy, atomic absorption, x-ray fluorescence and diffraction, and neutron activation analysis.

8. Method of Instruction

a. Lecture with an emphasis on quantitative and qualitative problem solving.

b. Discussion of topic related to course material both in-person and in the learning management system.

c. Demonstration of chemical phenomenon, videos, PowerPoints, other multimedia, etc.

d. Inquiry-based laboratory experiences.

e. Peer presentations.

9. Methods of Evaluating Student Performance

a. Written exams and final exam which may include fill-in-the-blank, short answer, multiple choice, and essay questions.

b. Laboratory reports such as descriptions and analysis of chemical reactions or analytic determinations.

c. Laboratory techniques to include proper safety procedures, use of laboratory equipment, and complete documentation of data.

d. Essays/presentations on topics such as experimental results, descriptive chemistry, or current issues in chemistry.

e. Homework. Homework and various assignments are used to teach and emphasize content including, but not limited to reading texts, watching videos, or computer aided instructional exercises.

10. Outside Class Assignments

a. Homework, both text and computer based. Homework and various assignments are used to teach and emphasize content including, but not limited to reading texts, watching videos, or computer aided instructional exercises.

b. Laboratory reports such as descriptions and analysis of chemical reactions or analytical determinations.

c. Short essays/presentations on topics such as experimental results, descriptive chemistry or current issues in chemistry.

11. Representative Texts

a. Representative text(s):

(1) Hein, Morris and Susan Arena. *Foundations of College Chemistry*. 15th edition. Hoboken, NJ: John Wiley & Sons, 2016.

(2) Laboratory manual. Lehman, Jeff, et al. *Chem 113 Laboratory Manual*, 3rd edition, El Cajon, California: Grossmont College, 2019.

b. Supplementary texts and workbooks:

Approved laboratory notebook such as Scientific Lab Notebook by Hayden-McNeil or Composition Notebook

Addendum: Student Learning Outcomes

Upon completion of this course, our students will be able to do the following:

* 1. Demonstrate a working knowledge of the language of chemistry.
  2. Apply quantitative reasoning to chemical problems
  3. Apply a laws and theories to explain and predict the properties of atoms and molecules.
  4. Employ laboratory equipment and techniques to collect, organize and evaluate experimental data.