RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

CHEM 102 – Introduction to Chemistry

I. Basic Course Information

B. Course Number and Title: CHEM 102 – Introduction to Chemistry

B. New or Modified Course: Modified

C. Date of Proposal: Semester: Fall Year: 2022

D. Effective Term: Fall 2023

E. Sponsoring Department: Science & Engineering

F. Semester Credit Hours**: 4**

G. Weekly Contact Hours**:** 6 Lecture**:** 3
Laboratory**:** 3
Out of class student work per week: 7.5

H. ☒ Prerequisite (s): MATH 020 Elementary Algebra
☐ Corequisite (s):
☐ Prerequisite (s) and Corequisite (s)**:**

I. Additional Fees**:** No

J. Name and E-Mail Address of Department Chair and Divisional Dean at time of approval**:** Marianne Baricevic (marianne.baricevic@raritanval.edu); Sarah Imbriglio (sarah.imbriglio@raritanval.edu)

II. Catalog Description

Prerequisite: MATH-020 Elementary Algebra

An introduction to the fundamental principles of chemistry for students in some allied health fields. This course may be used as a preparation for General Chemistry by students with no prior chemistry, but credit will not be given for both Introduction to Chemistry and General Chemistry I. The course includes a study of selected basic principles of chemistry and an introduction to chemical laboratory techniques. Three hours of lecture/discussion and a three hour laboratory per week.

III. Statement of Course Need

A. This is a standard non-majors science course to fulfill a laboratory-based general education requirement.

B. The course has a laboratory component, as is commonly found within chemistry programs. The laboratory offers the students the ability to work with equipment that they will see in further studies, and in their career work. The laboratory exercises are closely matched with the lecture material to both reinforce and offer additional learning opportunities.

C. This course generally transfers as a general education Science laboratory course, and as a program requirement in a variety of Allied Health programs (e.g., Dental Hygiene, some Chiropractic programs and some Nursing programs).

IV. Place of Course in College Curriculum

A. Free Elective
B. This course serves as a Laboratory Science General Education course
C. This course is required for the Medical Laboratory Technology AAS program. This course may also transfer into a variety of Allied Health programs (such as Dental Hygiene, some Chiropractic programs, some Nursing programs). Students must check with Advising, Counseling, and Transfer Services and/or their prospective transfer institution to determine transferability.
D. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, www.njtransfer.org; b) for all other colleges and universities, go to the individual websites.

V. Outline of Course Content

A. Lecture Topics

1. Basic Vocabulary of Chemistry
2. Measurement, and calculations:
    a. Measurement and the metric system
    b. Working with numbers (exponential notation, significant figures, uit analysis)
3. Atomic Structure
    a. Basic atomic structure, isotopes
    b. Atomic mass versus atomic mass number
4. Electronic structure and the Periodic Law
    a. The Periodic Table
    b. Electronic arrangements, chemical properties
    c. Electron configurations
    d. Periodic Trends
    e. Ions
5. Chemical Bonding
    a. Noble gas configuration, ionic bonding
    b. Covalent bonding, molecular geometry and polarity

6. Formula Writing and Nomenclature
    a. Naming binary compounds
    b. Using the Stock System
    c. Formula writing
7. Molar Mass and the Mole
    a. Calculating molar mass using Periodic Table
    b. Converting between grams and moles
    c. Using Avogadro's number in calculations
    d. Calculating empirical and molecular formulas
8. Chemical Reactions
    a. Chemical equations
    b. Types of reactions (synthesis, decomposition, single and double displacement, combustion)
9. Stoichiometry
    a. Solving various stoichiometric problems
    b. Solving Limiting Reactant stoichiometry problems
10. The States of Matter
    a. Kinetic theory of matter
    b. Solids, liquids and gases
    c. Changes in state (boiling, melting, sublimation, vapor pressure)
    d. Energy and the states of matter
11. Gases
    a. Pressure, volume and temperature and STP
    b. Dalton's Law of gas pressure
    c. Various gas law problems
12. Solutions
    a. Physical states of solutions
    b. Solubility and the solution process
    c. Solution stoichiometry (concentration units, preparation of solutions, calculations)
    d. Dissociation and ionization
    e. Colligative properties
13. Acids, bases and salts
    a. Theories of acidity
    b. Naming acids
    c. The pH scale
    d. Properties of acids, bases and salts
    e. Analysis of acids, bases and salts (titration calculations

B. Laboratory Experiments (suggested):

1. Measurement and Significant Figures/Use of Chemical Balances
2. Volumetric Ware/Determination of Density
3. Physical and Chemical Changes
4. Separations and Analysis

5. Empirical Formula of Magnesium Oxide
6. Classification of Chemical Reactions
7. Stoichiometric Analysis using Decompositions Reactions
8. Temperature of the Bunsen Burner by Indirect Means
9. Molar Volume of a Gas
10. Solution Formation and Characteristics
11. Colligative Properties of Solutions
12. Acids, Bases, Salts and Buffers
13. Titrimetric Analysis of Vinegar
14. The Acidic Hydrogens of Acids (Titrimetric Analysis)

VI. A. Course Learning Outcomes:

At the completion of the course, students will be able to:

1. Describe the basic principles of chemistry (GE-2)
2. Solve quantitative problems representative of basic principle of chemistry (~~NJ~~ GE-2,3)
3. Apply basic laboratory techniques of chemistry to the performance of a variety of experiments relevant to the course material (GE-3)
4. Report results of laboratory experiments (GE-1)

B - Assessment Instruments

1. Semester Exams
2. Homework and quizzes
3. Cumulative Final Exam
4. Laboratory Report
5. Laboratory Practical

VII. Grade Determinants

A. Performance on grades exams, quizzes, homework, final exam
B. Performance in the laboratory
C. Graded laboratory reports.

Given the goals and outcomes described above, LIST the primary formats, modes, and methods for teaching and learning that may be used in the course:

A. lecture/discussion
B. problem solving sessions
C. laboratory (including data gathering and analysis using computers)

VIII. Texts and Materials

A. Suggested textbook

Chemistry: Atoms First (2nd edition). OpenStax.
https://openstax.org/details/books/chemistry-2e

The following statement should be included in the outline:
(Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.)

IX. Resources

Laboratory facilities and instrumentation in the Christine Todd Whitman Science Center

X. Honors` Options [if relevant]

Not Applicable