SOUTHEAST COMMUNITY COLLEGE
DIVISION OF ARTS AND SCIENCES
Sciences
Revision Date: 07-01-19
Syllabus Statements

I. CATALOG DESCRIPTION

Course Number:	CHEM1050
Course Title:	Chemistry and the Citizen
Prerequisite(s):	MATH1100 or MATH1103 or higher or appropriate math placement score
Catalog Description:	Designed for the non-science major. Survey of principles of chemistry, stressing concepts and qualitative understanding along with problem solving and technical skills. This course not only introduces inorganic chemistry but also includes an introduction to organic chemistry and biochemistry. Lab must be taken concurrently.
Credit Hours:	4.0
Class Hours:	45
Lab Hours:	30
Total Contact Hours:	75

II. COURSE OBJECTIVES: *Course will:*

A. Show students the relationships between measurements, units, and prefixes in the metric system.
B. Demonstrate the factor label method of problem solving.
C. Discuss the periodic table.
D. Discuss how to determine charges for ionic compounds.
E. Discuss how to determine formulas for covalent compounds.
F. Discuss atomic number, atomic mass, mass number and isotopes of elements.
G. Demonstrate how to calculate moles, molar mass.
H. Demonstrate mole relationships in chemical equations.
I. Demonstrate how to solve for mass calculations in reactions.
J. Demonstrate the gas laws.
K. Discuss solution properties and concentration of solutions
L. Discuss acid and bases, the pH scale and reactions of acids and bases.
M. Discuss the concept of buffer solutions
N. Discuss organic chemistry: Alkanes, Alkenes and Alkynes and the proper nomenclature and reactions.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES

A. Student Learning Outcomes: *Students will be able to:*

1. Apply the dimensional analysis method to unit conversions, mass relationships in chemical formulas and chemical equations, concentrations, and gas law calculations.
2. Apply the metric system while taking experimental data.
3. Show relationships for elements based on their location in the periodic table and their locations with respect to other elements.
4. Write chemical formulae for molecular and ionic compounds based on the elements' locations in the periodic table.
5. Apply the various gas laws and the ideal gas constant to relationships that involve moles, temperature, volume, and pressure.

B. General Education Learning Outcomes

1. GELO #3: Critical Thinking & Problem Solving

Outcome: Collect, identify, interpret and analyze data.

Outcome: Synthesize information to arrive at reasoned solutions to problems.

Outcome: Evaluate the validity of arguments, alternatives, data, outcomes, and/or impacts of actions.

2. GELO #5: Analytical, Quantitative, and Scientific Reasoning

Outcome: Apply mathematical and scientific methods to solve problems from an array of contexts and everyday situations.

Outcome: Effectively develop strategies, algorithms, or experiments (or performing experiments) to better describe the systems or to solve the problems.

IV. CONTENT/TOPICAL OUTLINE (*course outline may provide more detailed information*)

A. Scientific Method:

1. Understand the scientific method

B. Measurements:

1. Understand units of measurement
2. Work with and correctly use scientific notation
3. Understand the difference between measured numbers and significant figures
4. Work with significant figures in calculations
5. Understand prefixes and equalities
6. Understand how to write conversion factors
7. Understand and demonstrate problem solving
8. Calculated density
9. Relate this information to drug dosage and body mass

C. The Study of Energy and Matter:

1. Understand energy
2. Understand temperature conversions
3. Calculate specific heat
4. Describe the states of matter
5. Describe the changes of state of matter

D. The Study of Atoms

1. Classify matter
2. Elements and symbols
3. Study the characteristics of the periodic table
4. Understand the atom
5. Understand atomic number and mass number
6. Understand isotopes and atomic mass
7. Understand periodic trends

E. The Study of Compounds and Their Bonds

1. Understand the octet rule and ions
2. Understand the difference between ionic bonds, covalent bonds, and hydrogen bonds
3. Understand the significance of each of those bonds
4. Identify select polyatomic ions
5. Understand naming and writing ionic formulas
6. Understand naming and writing covalent compounds
7. Understand electronegativity and bond polarity
8. Understand the similarities and differences between polar covalent and nonpolar covalent bonds

F. The Study of Chemical Quantities and Reactions

1. Understand the mole
2. Understand how to calculate molar mass

3. Understand chemical changes
4. Understand how to read and write chemical equations
5. Understand how to identify the different types of reactions
6. Calculate mole relationships in chemical reactions
7. Calculate mass relationships in chemical reactions
8. Understand the concept of energy in chemical reactions

G. The Study of Gases
1. Understand the properties of gases
2. Understand pressure and the pressure of gas
3. Understand the relationship between pressure and volume of gases
4. Calculate using the gas law relating pressure and volume
5. Understand the relationship between temperature and volume of gases
6. Calculate using the gas law relating temperature and volume
7. Understand the relationship between temperature and pressure of gases
8. Calculate using the gas law relating temperature and pressure
9. Understand the relationship between temperature, pressure and volume (combined gas law)
10. Calculate using the combined gas law
11. Understand the relationship between volume and moles of a gas
12. Calculate using the gas law relating volume and moles of gas
13. Know the values of pressure, temperature and moles of gas for STP conditions
14. Understand the relationship between the partial pressures of gas in a system and the total pressure of the gases
15. Calculate using the gas law that relates partial pressures of gases to the total pressure of the system

H. The Study of Solutions
1. Understand the definition of solution
2. Understand the differences between electrolytes and nonelectrolytes
3. Understand solubility
4. Understand percent concentration including %(m/v), %(v/v) and %(m/m)
5. Calculate percent concentrations
6. Understand molarity and dilutions
7. Calculate molarity
8. Calculate using dilution equation

I. The Study of Acids and Bases
1. Understand the definitions of acids and bases
2. Understand some properties of acids and bases
3. Understand acid strength and base strength
4. Understand ionization of water
5. Calculate the $[H_3O^+]$ and $[OH^-]$ concentrations of solutions
6. Understand the pH scale
7. Calculate pH
8. Understand definition of buffers
9. Understand the components of a buffer
10. Understand how buffers work
11. Relate this information to varying pH conditions of the human body
12. Relate this information to various buffers in the human body

J. The Study of Organic Chemistry—Alkanes
1. Understand the structure of alkanes
2. Understand the structure and naming of alkanes
3. Understand the structure and naming of alkanes with substituents
4. Understand the properties of alkanes

5. Understand the structure and function of functional groups
6. Understand the characteristics of alkanes, alkenes, and alkynes

K. The Study of Organic Chemistry-Unsaturated Hydrocarbons-Alkenes and Alkynes
1. Understand the structure and naming of alkenes and alkynes
2. Understand the structure and identification of cis-trans isomers
3. Understand addition reactions
4. Understand the structure of aromatic compounds – compounds that contain benzene

V. INSTRUCTIONAL MATERIALS

A. Required Text(s):
1. Timberlake, *Chemistry: An Introduction to General, Organic and Biological Chemistry*. 13th Edition, Prentice Hall, 2017. ISBN: 978-0-134-42135-3.

B. Other Resources:
1. Safety glasses for laboratory

VI. METHODS OF PRESENTATION/INSTRUCTION

A. Methods of presentation typically include a combination of the following:
1. Lecture
2. Group work
3. Lab work
4. Online supplementary materials
5. Demonstrations

VII. METHODS OF EVALUATION

A. Methods of evaluation typically include a combination of the following:
1. Exams/Quizzes
2. Reports/Papers
3. Lecture Homework

B. SCC GRADING SCALE

A+	95-100	C+	75-79	F	59 or less
A	90-94	C	70-74		
B+	85-89	D+	65-69		
B	80-84	D	60-64		

VIII. SPECIFIC COURSE REQUIREMENTS

A. A minimum grade of "C" or better is required to qualify for transfer to a four-year college.