

Montgomery County Community College
 CHE 118
 Introduction to Chemistry and Food Science
 (For the non-science major)
 4-3-3

COURSE DESCRIPTION:

This course is designed for non-science major students to gain introductory knowledge of general chemistry and food chemistry. Topics include fundamental facts, principles and techniques of chemistry along with the basics of food chemistry.

REQUISITES:

Previous Course Requirements

- One year of high school algebra or MAT 011 – Beginning Algebra

Concurrent Course Requirements

None

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Using correct terminology incorporate the elements of scientific method into an explanation of an experiment.	Lecture Small group discussion Laboratory experiments Daily reading and problem solving Assignments	Sectional examination Final comprehensive examination Laboratory experiments and reports
2. Solve quantitative problems covering the properties and reactions of simple inorganic substances and mixtures.	Lecture Small group discussion Laboratory experiments Daily reading and problem solving Assignments	Sectional examination Final comprehensive examination Laboratory experiments and reports
3. Perform laboratory experiments on the qualitative and quantitative properties of simple inorganic substances and mixtures.	Laboratory Experiments (Including Computer-Based Laboratory Experiments)	Laboratory Experiments (Including Computer-Based Laboratory Experiments)

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
4. Apply the scientific method to simple inorganic laboratory experiments.	Lecture Small Group Discussions Laboratory Experiments (Including Computer-Based Laboratory Experiments) Daily Reading and Problem-Solving Assignments	Sectional examination Final comprehensive examination Laboratory experiments and reports
5. Discuss the structure, nomenclature, properties and reactions of selected type of organic compounds.	Lecture Small group discussion Laboratory experiments Daily reading and problem solving Assignments	Sectional examination Final comprehensive examination Laboratory experiments and reports
6. Discuss the structure, properties and reactions of selected types of food molecules (water, protein, lipids, carbohydrates)	Lecture Small group discussion Laboratory experiments Daily reading and problem solving Assignments	Sectional examination Final comprehensive examination Laboratory experiments and reports

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that 70% of students will meet or exceed outcome criteria.

SEQUENCE OF TOPICS

Introduction to science and general chemistry

A) Lecture

1. Introduction to science
 - A. Scientific method, hypothesis, and experiment
 - B. Facts, theories and laws
2. Introduction to chemistry
 - A. General classification of matter
 - B. Properties, and changes of matter
 - C. Elements, compounds, and mixture
3. Chemical calculations and measurement systems
 - A. SI and metric measurement systems
 - B. Scientific notation and significant figures
 - C. Factor-label method conversions
 - D. Temperature, density, and specific heat calculations

4. Atomic structure
 - A. Atomic structure according to Bohr model and subatomic particles
 - B. Atomic number, mass number, atomic mass and isotopes
 - C. Periodic Table
 - D. Electronic structure of atoms
5. Chemical bonds
 - A. Formation of ionic bonds
 - B. Common ions including polyatomic ions
 - C. Properties of ionic compounds
 - D. Formula of ionic compounds
 - E. Describe formation of covalent bonds and molecules
 - F. Properties of covalent compounds
 - G. Polar bond, nonpolar bond and hydrogen bond
6. Chemical reactions and stoichiometry
 - A. Writing and balancing chemical equations
 - B. Precipitation, acid-base and redox reaction
 - C. Mole concept
 - D. Stoichiometry
7. Introduction to organic chemistry
 - A. Carbon atom and its bonding capabilities.
 - B. Structure of alkanes, alkenes, alkynes, and cycloalkenes.
 - C. Recognize common functional groups, such as: hydroxyl, carboxyl, amine, phosphate etc.
 - D. Free radicals
 - E. Introduction to stereochemistry: cis-trans isomers and optical isomers
8. Water in foods
 - A. Water
 - B. Nature of water molecule
 - C. Concept of acid-base and pH
 - D. Water in food preparation
 - E. Water activity in food
 - F. Water as plasticizer
9. Lipid in foods
 - A. Fatty acids
 - B. Glycerides
 - C. Properties of fat molecules
 - D. Modification of fats: hydrogenation, interesterification, rancidity
 - E. Fats and oils in marketplace

10. Protein in foods

- A. Amino acids
- B. Structure and properties of proteins
- C. Functions of proteins: enzyme, emulsifier, foam, thickening agent
- D. Food protein systems: milk, egg

11. Carbohydrate in foods

- A. Simple sugars: Monosaccharides, disaccharides
- B. Starch
- C. Properties of carbohydrates
- D. Alternative sweetener

B) Laboratory Activities

A minimum of eight laboratory experiments are to be conducted during the semester. A list of experiments (or a reasonable substitute) is indicated below. Additional laboratory activities are strongly recommended.

1. Laboratory techniques
2. Measurements
3. Properties of solution
4. Chemical model building
5. Common chemical reactions in aqueous medium
6. Acid-base neutralization and measurement of pH
7. Properties of water (freeze-thaw phenomena)
8. Lipids (melting point, cloud point, viscosity, plasticity)
9. Analysis of baking soda and baking powders
10. Properties of food hydrocolloids (gelatin)

LEARNING MATERIALS

Course notes, worksheets etc. will be made available to students through blackboard. Additional reference materials are available in the library for further reading.

Food: The Chemistry of its Components. Edition 5 by Tom Coultate

The Chemistry of Food. 2014, Jan Velisek Wiley-Blackwell

Food Chemistry: A Laboratory Manual 1998, Dennis D. Miller , Wiley

Fennema's Food Chemistry, Fourth Edition. (CRC Press), Damodaran, S., Parkin, K. L., and Fennema O. R.

The Food Chemistry Laboratory: A Manual for Experimental Foods, Dietetics, and Food Scientists, Second Edition (Contemporary Food Science) 2nd Edition, Connie M. Weaver James R. Daniel

Laboratory Manual for Foods: Experimental Perspectives 8th Edition, Margaret McWilliams Ph.D. R.D. Professor Emeritus

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

COURSE APPROVAL:

Prepared by: Samali Datta

Date: 2/20/2016

VPAA/Provost or designee Compliance Verification:

Victoria L. Bastecki-Perez, Ed.D.

Date: 2/2/2017

This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.