

Course discipline/number/title: CHEM 1031: Introduction to Forensic Chemistry

A. CATALOG DESCRIPTION

1. Credits: 3
2. Hours/Week: 2 lecture, 2 lab
3. Prerequisites (Course discipline/number): None
4. Other requirements: None
5. MnTC Goals (if any): Goal 3/Natural Sciences

B. COURSE DESCRIPTION: Forensic science is the application of scientific knowledge in the criminal justice system. A forensic chemist uses the principles and techniques of chemistry to analyze physical evidence within the crime lab. This introductory lecture/laboratory course for non-science majors teaches the elementary concepts of chemistry through the lens of forensic chemistry.

C. DATE LAST REVISED (Month, year): February, 2021

D. OUTLINE OF MAJOR CONTENT AREAS:

1. Introduction to forensic chemistry
 - a) Chemistry, crime and global society
 - b) Physical evidence: Matter and its forms
 - c) The periodic table
 - d) Critical thinking and the crime scene: The Scientific Method
2. Evidence collection and preservation
 - a) Reactions, properties and changes
 - b) Mass, weight and units
 - c) Unit conversions
 - d) Measurements
 - e) Significant digits
 - f) Experimental results: Accuracy and Precision
3. Chemical Evidence
 - a) Nature of chemical evidence: Regions of the Periodic Table
 - b) Types of Compounds: Covalent and Ionic
 - c) Names of compounds
 - d) Types of chemical reactions
 - e) Balancing chemical equations
 - f) Mole concept and elementary stoichiometry and limiting reactant
4. Structure and Function of Drug Molecules
 - a) Nature of Covalent bonds
 - b) Lewis Structures, Resonance Structures and VSEPR Theory
 - c) Polarity of bonds and molecules
 - d) Molecular geometry of drugs, drug receptors and brain chemistry
5. Solutions
 - a) Colligative properties
 - b) Concentration units
 - c) Acid-Base Chemistry
6. Drug Chemistry
 - a) Introduction to Organic Chemistry
 - b) Extraction of Organic compounds: Solubility and acid-base properties.
7. Chemistry of explosions
 - a) Heat, temperature, specific heat and units of energy

- C. OUTLINE OF MAJOR CONTENT AREAS: Continued. . .
- b) Endothermic and exothermic processes
 - c) Gas laws in relation of chemical explosion
- E. LEARNING OUTCOMES (GENERAL): The student will be able to:
1. Demonstrate basic forensic and chemical vocabulary.
 2. Connect chemistry to its role within the crime lab.
 3. Solve scenario-based problems using chemical concepts and the scientific method.
- F. LEARNING OUTCOMES (MNTC):
- Goal 3/Natural Sciences: Students will be able to:
1. Demonstrate understanding of scientific theories.
 2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, student's laboratory experience in the collection of data, it's statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
 3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.
- G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:
1. Laboratory handouts and/or quizzes
 2. Problem-solving tests
 3. Group project/report
- G. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s): Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.
- H. SPECIAL INFORMATION (if any):
- The initial lab session explains and familiarizes the student with general safety hazards and safety equipment in the lab. During the pre-lab discussion, the hazardous characteristics of the chemicals used during the lab are discussed. The students will be instructed on the proper disposal of any hazardous products. The instructor will direct all students to wear necessary protective equipment while working with the chemicals.