

# Minnesota State University Moorhead

## CHEM 105: Crime Scene Science

### A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 2

Lab Hours/Week: 2

OJT Hours/Week: \*.\*

Prerequisites: None

Corequisites: None

MnTC Goals: Goal 03 - Natural Science

Students will study basic chemical and science principles in the context of crime scene investigations. Laboratory investigations will accompany the content, which will provide an understanding of the scientific method, the relationship between hypotheses and theories, data collection and analysis. Students will work on a final investigation and present their findings during the scheduled final exam time. Credit not applicable to a chemistry major or minor. MnTC Goal 3.

**B. COURSE EFFECTIVE DATES:** 09/22/2011 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. The scientific method and application of scientific method to each of the class lab exercises, culminating in an end of semester investigation.
2. Properties and states of matter, using study and measurements of physical evidence as context.
3. Physical and chemical properties of matter, using study and measurement of physical properties of evidence materials as context.
4. Atoms, molecules and the periodic table and study of spectroscopy in forensic science.
5. Light and other types of radiation that interact with living and non-living materials and how this can be used to analyze gathered evidence.
6. Formulas, equations, compounds and reactions using forensic science testing as examples.
7. Water, solutions and acids and bases, using concerns about industries releasing toxic pollutants into freshwater.
8. Classes of compounds and their properties and detection in crime scene investigations.
9. The science of combustion and other energy considerations, in the context of crimes such as arson investigation.
10. Biochemicals in living systems and their detection and identification of individuals based on their individual characteristic such as fingerprints and DNA patterns.
11. Labs include the gathering and study of the properties of physical evidence, such as ink analysis, soil and glass analysis, and latent fingerprint collection and analysis. Other labs include drug analysis, study of organisms that gather post-mortem due to chemical breakdown of living material and DNA fingerprinting simulation.
12. Final lab requires use of science principles learned through forensic techniques to solve a staged crime. Students collect and analyze evidence and submit a final report on their results.

#### **D. LEARNING OUTCOMES (General)**

1. Understand the influence of society on the practice of science.
2. Make informed decisions and choices about societal issues based on a scientific understanding of the underlying phenomena.
3. Explain the basic concepts of sciences such as chemistry and related disciplines as they relate to forensic investigations.
4. Recognize and define problems and formulate and test hypotheses using data collected by observation or experiment. One project must develop, in greater depth, students' laboratory or field experience in the collection of data, its quantitative and graphical analysis, its interpretation, its reporting, and an appreciation of its sources of error and uncertainty.

#### **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

Goal 03 - Natural Science

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, students' laboratory experience in the collection of data, its 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.
4. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

#### **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

#### **G. SPECIAL INFORMATION**

None noted