

**STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK**

COURSE OUTLINE

CHEM 108 INVESTIGATIVE CHEMISTRY LABORATORY

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**SCHOOL OF SCIENCE, HEALTH & PROFESSIONAL STUDIES
SCIENCE DEPARTMENT
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CHEM 108 INVESTIGATIVE CHEMISTRY LABORATORY

- A. TITLE: Investigative Chemistry Laboratory
- B. COURSE NUMBER: CHEM 108
- C. CREDIT HOURS: 1
- D. WRITING INTENSIVE COURSE (OPTIONAL): No
- E. COURSE LENGTH: 15 weeks
- F. SEMESTER(S) OFFERED: Spring
- G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:
Lab 2 hours a week

H. CATALOG DESCRIPTION:

Investigative Chemistry Laboratory is a laboratory course to accompany Investigative Chemistry (CHEM 108). This laboratory course is designed to provide scientific laboratory experiences in chemistry relevant to forensic science. Each exercise involves the collection of data, manipulation of the collected data, and analysis of the data. The experiments include density of plastic material, chromatographic analysis of ink, types of chemical reactions, factors that affect the rate of chemical reactions, detection of common gases, spectroscopic analysis of analgesics, qualitative analysis of blood and urine, breathalyzer test, detection of blood, heat capacity of building materials, fingerprint development methods, and detection of gunshot residue. Two hours per week. Co-requisite: Investigative Chemistry (CHEM 107) or permission of instructor. A student cannot receive credit for both CHEM 108 and CHEM 100.

- I. PRE-REQUISITES/CO-COURSES: Prerequisite/Co-requisite: Investigative Chemistry (CHEM 107) or permission of instructor.
- J. STUDENT LEARNING OUTCOMES: Upon completion the student will be able to:

<i>Course Objective</i>	<i>Institutional SLO</i>
1. Apply the scientific method to be able to perform laboratory techniques correctly using appropriate experimental apparatus and safety procedures.	2. Crit. Thinking 3. Prof. Competence
2. Analyze the results of laboratory experiments, evaluate sources of error, and interpret quantitative and qualitative data and/or information.	2. Crit. Thinking 3. Prof. Competence

K. TEXTS:

Heldt, N., *Investigative Chemistry Lab Manual, Spring 2015*, online via ANGEL/blackboard.

L. REFERENCES:

Johll, Matthew, *Lab Manual for Investigating Chemistry a Forensic Science Perspective*, W.H. Freeman and Co. New York, 2008

Internet sites too numerous to cite

M. EQUIPMENT:

Students will be required to supply themselves with a scientific calculator that can do logarithms and powers of 10, safety goggles, lab apron, and a bound laboratory notebook.

N. GRADING METHOD (P/F, A-F, etc.): A-F

O. MEASUREMENT CRITERIA:

Graded Laboratory Assignments and Safety Quiz	85 %
Practical Exam	15 %

P. DETAILED TOPICAL OUTLINE:

1. Check in, Safety, Measurement at a Crime Scene
 - a. Use mass and volumetric tools and techniques
 - b. Record measurements to the correct degree of accuracy obtainable by the measuring device
2. Density Analysis of Plastics
 - a. Determine the density of a plastic polymer sample by suspending it in solutions of known density
3. Paper Chromatography
 - a. Dissolve ink from known sources in different solvents
 - b. Use paper chromatography to separate the components of each type of ink and compare known ink marks with an unknown.
4. Presumptive Blood Identification Tests
 - a. Use common blood identification tests to test for blood in various diluted and washed samples of blood, along with substances that can be mistakenly identified as blood
5. Analysis of Blood and Urine
 - a. Identify common electrolytes, proteins, glucose and ketones found in blood and urine.
6. Fingerprints
 - a. Identify fingerprints using light source, fingerprint powder, iodine fuming.
 - b. Develop fingerprints using ninhydrin, superglue, silver nitrate, and sticky tape.
7. The Breathalyzer Reaction
 - a. Determining blood alcohol content of a solution with potassium dichromate
8. Types of Chemical Reactions
 - a. Observe chemical reactions and identify the type of reaction each is
 - b. Write balanced chemical equations showing the correct reactants and product.
9. Spectroscopic Analysis of an Analgesic

- a. Prepare various solutions of a known analgesic and measure absorbance using spectrophotometer.
 - b. Use spectroscopy to measure the absorbance of the analgesic in an over the counter headache medicine
10. Heat Capacity of a Building Material
- a. Determine the specific heat capacity of several different types of building materials (metals, rock, or concrete)
11. Evolution and Detection of Gases.
- a. Carry out chemical reactions that produce gases
 - b. Correctly write and balance gas forming reactions
 - c. Identify formed gases by their physical and chemical properties
12. Factors That Affect the Rates of Chemical Reactions
- a. Study a number of factors that affect the rate of a chemical reaction
13. Gunshot Residue Tests
- a. Use the Greiss test, sodium rhodizonate test, and diphenylamine test to identify and enhance the presence of gunshot residue found in a sample
14. Lab Practical Exam and Check out.