

BILLINGS PUBLIC SCHOOLS
SURVEY OF FORENSIC SCIENCE/ FORENSIC SCIENCE
Learner Objectives

MISSION STATEMENT

The Career Center is dedicated to providing Billings area students with an education that explores and enhances vocational and academic skills to promote critical thinking, self-discipline, and responsible citizenship.

PHILOSOPHY

It is the philosophy of the Forensic Science program that students learn and retain information and concepts better when learning is relevant and experiential. The Forensic Science program is designed to integrate science and mathematics with the high interest job fields of forensic science and criminal justice. The objectives of the course are to encourage students to use critical thinking and actions based on chemical, physical, biological and mathematical principles while exploring the many career areas of forensic science and criminal justice. The course uses a large number of laboratories and investigations as instructional tools to meet these objectives. Safety therefore is an issue that is stressed in all study areas both on and off campus. The Career Center is committed to student involvement in the community and community involvement in student education. To meet this commitment, off campus educational sites which have relevancy to the curriculum will be used when advantageous to the goals of the program.

LEARNING DOMAINS

- I. Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.**
- II. Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.**
- III. Students, through the inquiry process, demonstrate knowledge of characteristics, structures and function of living things, the process of diversity of life, and how living organisms interact with each other and their environment.**
- IV. Students, through the inquiry process, demonstrate knowledge of the composition, structures, processes and interactions of Earth's systems and other objects in space.**
- V. Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures, and societies.**
- VI. Students understand historical developments in science and technology.**

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- I. Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.**
1. Student will identify the appropriate safety practices for an investigation.
 2. Student will gather data (qualitative/quantitative) using appropriate measurements and methods.
 3. Students will apply the metric system by appropriate use of units and conversion factors.
 4. Students will apply appropriate mathematical analysis.
 5. Students will demonstrate graphing design (placement of dependent and independent variables/scaling/units/keys/titles/labels/graph types).
- II. Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.**
1. Student will recognize the Periodic Table is organized based on a series of repeating patterns.
 2. Student will utilize the Periodic Table to determine the number of valence electrons of an element.
 3. Student will utilize the Periodic Table to predict, from neutral atoms, the formation of ions with the number of electrons gained or lost.
 4. Student will recognize that chemical properties of elements change with the number of valence electrons.
 5. Student will compare and contrast ionic, covalent and hydrogen bonds.
 6. Student will describe the significance of electrons in interactions between atoms and why they sometimes form bonds.
 7. Student will explain how the chemical bonding of a molecule affects its macroscopic (physical) properties.
 8. Student will explain how the molecular geometry of a molecule (e.g. water) affects polarity and cohesive/adhesive properties.
 9. Student will explain how electrons are shared in single, double, triple bonds.
 10. Student will explain how the variety of carbon-carbon bonds leads to the diversity of biomolecules.
 11. Student will illustrate a chemical reaction using chemical formulas.
 12. Student will describe properties of chemical reaction classes (combustion, decomposition, synthesis, single-replacement, and double-replacement, etc.)
 13. Student will describe the energy changes in exothermic and endothermic reactions.
 14. Student will describe factors that effect the rate of reactions.

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II. Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems. (cont.)

15. Student will define the kinetic molecular theory and its relationship to heat (thermal energy transfer).
16. Student will compare the various electromagnetic waves (gamma rays, x-rays, ultraviolet, visible, infrared, microwave, and radio waves) in terms of energy and wavelength.
17. Student will identify practical uses of various electromagnetic waves.
18. Student will compare the visible light colors in terms of energy and wavelength
19. Students will recognize that atoms and molecules can gain or lose energy only in particular discrete amounts.
20. Student will recognize that every substance emits and absorbs certain wavelengths.
21. Student will compare the various electromagnetic waves (gamma rays, x-rays, ultraviolet, visible, infrared, microwave, and radio waves) in terms of energy and wavelength.
22. Student will identify practical uses of various electromagnetic waves.
23. Student will compare the visible light colors in terms of energy and wavelength
24. Student will recognize that atoms and molecules can gain or lose energy only in particular discrete amounts.
25. Student will recognize that every substance emits and absorbs certain wavelengths.

III. Students, through the inquiry process, demonstrate knowledge of characteristics, structures and function of living things, the process of diversity of life, and how living organisms interact with each other and their environment.

None purposefully written for this standard for Survey of Forensic Science/Forensic Science

IV. Students, through the inquiry process, demonstrate knowledge of the composition, structures, processes and interactions of Earth's systems and other objects in space.

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- V. Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures, and societies.**
- 26. Student will identify various scientific and technological innovations.
 - 27. Student will examine the ethical issues involved with the innovations.
- VI. Students understand historical developments in science and technology.**
- 28. Student will identify important historical events in science and technology.
 - 29. Student will analyze the positive and negative impacts of past, present, and future science and technological advances.
 - 30. Student will identify examples of scientific knowledge that have changed over time.

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COURSE DESCRIPTION

Survey of Forensic Science/ Forensic Science: Credits: 1; Semester: 1 or 2; Grade Level: 11 and 12; Prerequisite Courses: Biology, Algebra 1, and Geometry.

Survey of Forensic Science/ Forensic Science is a one-semester course that introduces the student to the many professions related to the forensic science/criminal justice field. The objective of the course is to encourage The student to use critical thinking and actions based on a strong science, math and safety curriculum while exploring career areas of forensic science and criminalistics. Numerous laboratories and investigations are used in the course to help meet this objective. The course utilizes community professionals from several forensic science and criminal justice areas to provide on-site learning experiences as part of the curriculum.

DELIVERY AND INTERGRATION

- Week 1 – Administrative –rules- course pre-test.
- Week 2 – Evolution of criminal investigation and forensic science – scientific method
Evaluation – participation, quizzes, test.
- Week 3 – Preliminary process of mock crime scene- forensic photography/ drawings/
measurements and mathematical conversions.
Evaluation – participation, log books, drawings, quizzes.
- Week 4 - Chemistry of inorganic compounds, their properties and identification –
periodic table trends – inorganic physical evidence analysis – labs.
Evaluation – worksheets, lab write-up, quizzes – unit test.
- Week 5 - Organic chemistry – structure/ functional groups.
Evaluation – worksheets, quizzes, lab write-ups.
- Week 6 – Organic physical evidence identification, labs.
Evaluation – worksheets, quizzes, lab write-ups, unit test.
- Week 7 – Toxicology of drugs poisons and alcohol. Structure/mechanisms/legal issues.
Evaluation – quizzes, lab write-up, participation, test.
- Week 8 – Hair/fiber/glass evidence processing and comparisons- labs.
Evaluation – lab write-ups, worksheets, quizzes.
- Week 9 - Serology/ bloodstain analysis – lab- nature of blood - use in forensic ID.
Evaluation – lab write-up, worksheet, unit test.
- Week 10/11 – DNA collection/processing/structure/amplification/separation/legal issues.
Evaluation – worksheets, quizzes, participation, lab write-ups.
- Week 12 – Fingerprinting- methods, preservation, nature of fingerprints, use in ID.
Evaluation – lab write-up, finished project, participation, quiz.
- Week 13 – Forensic anthropology/odontology/facial ID.
Evaluation – worksheet, lab write-up, participation, unit test.

- Week 14 – Gas laws, laws of motion, labs.
Evaluation – worksheets, quizzes, unit test.
- Week 15 – Explosives/fires/firearms/ballistics.
Evaluation – participation, lab write-ups, unit test.
- Week 16 – Forensic engineering, laws of vector resolution. Civil and criminal applications
Evaluation - Worksheets, quizzes, participation, lab write-up.
- Week 17 – Mock crime scene processing (cumulative) final.
Evaluation – log book, participation, final product and conclusion
- Week 18 – Mock trial, questioned documents, electronic forensics.
Evaluation – participation.
- Week 19 – Review/finals.
Finals/ post-test.