BLACK HORSE PIKE REGIONAL SCHOOL DISTRICT
HIGHLAND TIMBER CREEK TRITON
SCIENCE DEPARTMENT

SYLLABUS
FORENSIC SCIENCE
Course Content

Forensic Science focuses on problem solving, conducting experiments, and drawing conclusions based on evidence with an emphasis on forensic methodologies. Scientists need to be able to communicate results and conclusions in a team of 3 to 4 students. This is a laboratory based course involving analysis examinations of crime scenes, fingerprints, hair, fibers, DNA, toxins, bones, and blood spatter. This course is composed of lecture, inquiry based labs and activities, local guest speakers, and case study analysis. This vast course will introduce numerous basic techniques needed to solve the case.

1. **Introduction to Forensic Science: (**HS-LS3-1, HS-LS3-3, HS-ETS1-2**)**

   Seven Weeks- September-October

   - Explain how to secure, assess and study a crime scene,
   - Properly collect, document, and analyze crime scene evidence,
   - Recognize the role that various scientific disciplines play in the field of forensic science,
   - List and describe important contributions of historical figures in forensic science,
   - Explain the various services offered by a crime laboratory,
   - Evaluate the value of direct and indirect evidence in the court of law.

2. **Fingerprints: (**HS-ETS1-2, HS-LS1-2**)**

   Four Weeks-November-December

   - Describe how fingerprints are collected, developed, stored, and used in solving crimes,
   - Identify fingerprint ridge patterns,
   - Enhance and analyze latent fingerprint samples left behind upon various crime scenes surfaces using various methods of fingerprint development,
   - Prepare and present oral and written scientific reports that communicate in a logical sequence the process, results and validity of scientific experiments and research,
   - Explain how markings/impressions are made and used in forensic investigation,
   - Conduct a microscope analysis of organic and inorganic evidence.

3. **Hair and Fibers: (**HS-ETS1-2, HS-LS1-1, HS-LS3-3, HS-PS1-1**)**

   Four Weeks- December-January

   - Analyze and differentiate various microscopic samples of hair and fibers.
   - Understand why hair and fiber evidence are considered class evidence,
   - Describe chemical and physical tests used in analyzing trace evidence.
   - Assess the probative value of hair and fiber evidence.
   - Describe how different types of microscopes are used in analyzing and comparing evidence.
   - Identify unique microscopic patterns of certain organic and inorganic substances.
   - Prepare and present oral and written scientific reports that communicate in a logical sequence the process results and validity of scientific experiments and research.

4. **Toxicology: (**HS-ETS1-2, HS-LS1-2**)**

   Three Weeks-February

   - Classify the various types of illicit drugs and discuss the negative effects of these drugs,
   - Outline the federal penalties for possession and use of controlled substances,
   - Describe how various testing techniques (color/spot testing, chromatography, microcrystalline, spectrophotometry, mass spectrometry) can be used to identify specific toxins in a body,
   - Develop a procedure and conduct a laboratory experiment to confirm the presence or absence of toxins in a simulated sample,
   - Compare and contrast presumptive and confirmatory substance testing,
   - Present and interpret data using graphs,

- Outline the chemical break down of alcohol and explain the associated effects on the human body,
- Calculate blood alcohol content (BAC),
- Discuss the connection between blood alcohol levels and the law,
- Describe how and why breath-testing technology works,
- Research and analyze famous cases in history where poisons have been used to commit crimes.

5. **Serology & DNA: (**HS-ETS1-2, HS-PS1-2, HS-LS3-3, HS-LS1-1**)**

Seven Weeks-February-April

- Describe and utilize various presumptive tests (luminol and phenolphthalein) to determine if a stain is blood,
- Differentiate between human and animal blood using precipitin testing and microscopic examination,
- Identify and discuss the major components of blood,
- Summarize how ABO blood typing was developed, works, and is currently utilized in forensic science,
- Analyze unknown (simulated) samples to determine blood type,
- Interpret and analyze blood spatter/ stain evidence,
- Outline the basic molecular structure and function of DNA,
- Isolate and extract DNA from living cells,
- Identify the steps necessary to create a functional DNA fingerprint,
- Apply the concepts of RFLP, PCR, and STR's to characterize and analyze DNA samples.

6. **Human Remains & Entomology: (**HS-ETS1-2, HS-LS1-4, HS-PS3-4, HS-LS1-2, HS-PS1-5, HS-LS1-1**)**

Four Weeks-April

- Describe how the fields of anthropology and entomology have helped investigators determine information about victims and the nature of crime,
- Distinguish between human and animal bones,
- Identify the bones of the human body and contrast male and female human remains,
- Determine the age of an individual based on skeletal remains,
- Identify and measure the long bones of the human skeleton and use these bones to calculate an estimated height on an individual,
- Describe the effects of various forces (compression, torsion, shear, etc.) and trauma (blunt force, projectile, etc.) on human skeletal structures,
- Utilize evidence to recreate a crime scene,
- Compare rigor mortis, algor mortis, and livor mortis and use them to determine or calculate time of death,
- Identify and discuss the relationship between insect species and development, and time of death,
- Analyze environmental effects on human remains.

7. **Physical:** (HS-ETS1-2, HS-PS1-2)

Two Weeks-May

- Analyze patterns/markings on bullets created by firearms,
- Determine firearm identification based on patterns, markings, and bullets,
- Interpret gunpowder residue results as related to a case,
- Describe how various types of specialized law enforcement equipment are utilized by officers,
- Identify various methods that are used in arson investigations.

8. **Profiling: (**HS-ETS1-2, HS-PS1-2**)**

Four Weeks-May-June

- Explain the process of forensic handwriting analysis,
- Compare handwriting samples,
- Describe the document analysis techniques (handwriting analysis, chromatography, documentation),
- Explain how to determine if a bill is counterfeit,
- Identify various stages involved in the criminal profiling method including examination of traits of three main categories,
- Describe the contents of a criminal profiling report.

Course Expectations & Skills

1. Critically formulate questions, think through and solve problems
2. Record results and draw logical conclusions based on the evidence
3. Communicate the results of their work
4. Apply Locard's Exchange Principle in the collection, preservation and analysis of evidence
5. Explain how technology has revolutionized how forensic science solves crimes

Resources

Primary Text: Forensic Science for High School 2nd Edition by Ball-Deslich and Funkhouser

Supplementary Resources: Hidden Evidence by Owen
Criminalistics by Saferstein
Death's Acre by Bass
Crime Scene by Ragle

Grading Scale

Grades are calculated according to the following proportions
Major: Tests/Projects:40%
Minor: Quizzes- 10%
Daily Work: Homework / Classwork: 10%
Labs: 25%
Summative Assessment: 15%

Black Horse Pike Regional School District Curriculum Template ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

FORENSIC SCIENCE

Unit 1: Introduction to Forensic Science

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Forensic Science/Introduction to Forensic Science **Grade Level(s):** **11-12**	**Unit Summary**: Unit 1: Introduction to Forensic Science In this unit students will be exposed to the fundamentals of the legal system and the process a potential suspect has to go through. They will learn where the rights of an individual come from. They will explore the important historical figures and events that shaped the career of Forensic Science. There are specific protocol to follow to document, secure and process a crime scene and the evidence that is found there. Students will learn that Forensic Science is all about the details and documentation. The Evidence that is collected at a scene will be used in the court room. Eye witness accounts have limitations. Physical evidence has its place in the courtroom.
Essential Question(s): 1. How has forensic science evolved through history? 2. How is evidence used in the court of law? 3. How should a crime scene be secured, processed and examined?	**Enduring Understanding(s):** 1. Comprehension of local, state, and federal legislation as it applies to forensics. 2. Analysis of different types of scientific evidence in court cases. 3. Following systematic procedure of evaluating evidence to maintain objectivity

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS:**
1. Explain how to secure, assess and study a crime scene 2. Properly collect, document, and analyze crime scene evidence 3. Recognize the role that various scientific disciplines play in the field of forensic science 4. List and describe important contributions of historical figures in forensic science. 5. Explain the various services offered by a crime laboratory 6. Evaluate the value of direct and indirect evidence in the court of law.	**1.** HS-LS3-1, **2.** HS-LS3-3, **3.** HS-ETS1-2

Inter-Disciplinary Connections:

1. Students measure the size of a crime scene and all the items that are in the scene.
2. Draw a sketch of the crime scene to scale

3. Written notes are taken during the crime scene
4. Interview a policeman and ask him what types of reports are required for any investigation
5. Describe an actual court case where a particular type of evidence was used to help solve the crime
6. Calculate the probability of class evidence by taking sample sizes
7. Use a timeline to view historical figures' contributions to forensic science

Students will engage with the following text:

1. **Forensic Science for High School 2nd Edition by Ball-Deslich and Funkhouser**
2. **Hidden Evidence by Owen**
3. **Criminalistics by Saferstein**
4. **Any and all articles and case studies that pertain to the current subject matter.**
5. **Any and all instructions to activities and experiments that pertain to the current subject matter.**

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but are not limited to reading instructions aloud to help students understand the task at hand or the captions under pictures for auditory learners.

Students will write:

In addition to the usual warm ups, closing activities, lab reports, include example(s) of student activities requiring them to write:

1. **Students will summarize case studies by summarizing the following points:**
   a. What type of Crime was committed?
   b. Who were the victims?
   c. What is the Setting (Time and Place)?
   d. Name the suspects.
   e. List all the evidence that was used to solve the case.
   f. Taking the evidence from #5, describe the type of evidence (Testimonial or physical {class or individual})
2. **Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.**
3. **Lab reports in a standard format or conclusion essays may be required for certain lab activities.**

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

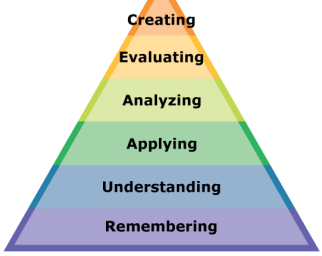
Students will:

- **Engage in textbook and other reading materials as described above**
- **actively participate in class discussions both teacher and peer initiated**

- **work collaboratively with peers on various assignments, labs, and/or projects**
- **Create various visual aids in the form of posters, diagrams, etc. (see assessment section for further detail)**
- **Conduct research using Chromebook resources**
- **Complete write to learn activities**

Teacher will :

- **Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials**
- **Use leading questions to spark classroom discussion**
- **Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.**



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class.
For example:

1. ***Documenting and Processing the Crime Scene Lab***
2. ***Evidence Questions***

On a daily basis, there are also many class work activities, as well as warm up and closing activities.

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

Students will be required to take tests to demonstrate proficiency on the material presented in this unit.
For Example:

1. ***Probability Test***
2. ***Unit One Test***

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Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

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Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports.

Crime Scene Skits
Observational worksheets and powerpoints

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Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

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Black Horse Pike Regional School District Curriculum Template ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

FORENSIC SCIENCE

Unit 2: Fingerprinting and Impressions

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Fingerprint and Impression **Grade Level(s):** **11-12**	**Unit Summary**: Unit 2: Fingerprints and Impressions: Each finger on each person in the world, thus far, have a unique pattern on the tips. Students will learn about the history of different ways for identification before fingerprints. Fingerprints are considered important pieces of evidence because they can be classified based on patterns and unique locations for its minutiaes. Students will develop latent prints through various physical and chemical methods. Once the prints are developed, students can match the print to known suspects and classify the suspects using Henry's Classification system. Other than fingerprints, students research other forms of identification: impressions of palm, foot, shoe, voice, ear, and retina.
Essential Question(s): 1. In what ways are fingerprints developed, stores, and used in solving crimes? 2. How are the markings/impressions made and used in forensic investigation?	**Enduring Understanding(s):** 1. Fingerprints are used as evidence to identify individuals 2. Markings /impressions are used to support evidence

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS**
1. Describe how fingerprints are collected, developed, stored, and used in solving crimes 2. Identify fingerprint ridge patterns 3. Enhance and analyze latent fingerprint samples left behind upon various crime scenes surfaces using various methods of fingerprint development 4. Prepare and present oral and written scientific reports that communicate in a logical sequence the process, results and validity of scientific experiments and research 5. Explain how markings/impressions are made and used in forensic investigation 6. Conduct a microscope analysis of organic and inorganic evidence	**1.** HS-ETS1-2, **2.** HS-LS1-2

Inter-Disciplinary Connections:

1. **Calculate Henry's Classification**
2. **Create a timeline indicating when it began and how it progressed**
3. **Match transparency of fingerprints to latent prints for comparison**
4. **Measure different body parts to compare the Bertillon's Method that was used before fingerprints**

Students will engage with the following text:

1. **Forensic Science for High School 2nd Edition by Ball-Deslich and Funkhouser**
2. **Hidden Evidence by Owen**
3. **Criminalistics by Saferstein**
4. **Any and all articles and case studies that pertain to the current subject matter.**
5. **Any and all instructions to activities and experiments that pertain to the current subject matter.**

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but are not limited to reading instructions aloud to help students understand the task at hand or the captions under pictures for auditory learners.

Students will write:

In addition to the usual warm ups, closing activities, lab reports, include example(s) of student activities requiring them to write:

1. **Students will summarize case studies by summarizing the following points:**
   a. What type of Crime was committed?
   b. Who were the victims?
   c. What is the Setting (Time and Place)?
   d. Name the suspects.
   e. List all the evidence that was used to solve the case.
   f. Taking the evidence from #5, describe the type of evidence (Testimonial or physical {class or individual})
2. **Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.**
3. **Lab reports in a standard format or conclusion essays may be required for certain lab activities.**

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

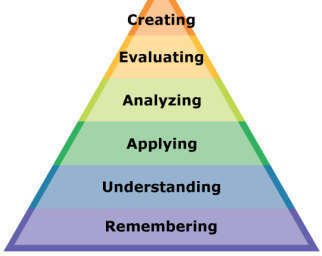
How will students uncover content and build skills.

Students will:

- **Engage in textbook and other reading materials as described above**
- **actively participate in class discussions both teacher and peer initiated**
- **work collaboratively with peers on various assignments, labs, and/or projects**
- **Create various visual aids in the form of posters, diagrams, etc. (see assessment section for further detail)**
- **Conduct research using Chromebook resources**
- **Complete write to learn activities**

Teacher will :

- **Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials**
- **Use leading questions to spark classroom discussion**
- **Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.**



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class.
For example:

1. ***Practicing lifting prints from different objects***
2. ***Classify fingerprints***
3. ***Henry's ID Classification***

On a daily basis, there are also many class work activities, as well as warm up and closing activities.

--examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

Students will be required to take tests to demonstrate proficiency on the material presented in this unit.
For Example:

1. ***Fingerprint Test***

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Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

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Performance Assessments:

1. **Students conduct a laboratory experiment about a person breaking into the classroom and left his/her fingerprints on different objects. The students will take the fingerprint scores of their peers to act as a known sample. Once the students are given the objects, they are to expose the latent print, lift it and classify it. Eight minutiae must be found on each unknown print collected to individualize it. They are then given the known samples to match with their lifted unknowns. As a conclusion to this lab, the students must write a formal report about their findings and explain how they came to their conclusion. The students follow a rubric while completing this activity and report.**
2. **Print Scores**

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Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments

Black Horse Pike Regional School District Curriculum Template ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Forensic Science

Course Number: 049101

Unit 3 - Trace Hair and Fiber Evidence

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Forensic Science/ Trace Hair and Fiber Evidence** **Grade Level(s):** **11th and 12th**	**Unit Summary:** **Unit 3 : Trace Hair and Fiber Evidence** **In this unit, students will explore the area of trace evidence, with an emphasis on hair and fibers. The concept of Class Evidence will be emphasized in this unit.** **In the first part of this unit, students will learn the structural anatomy of a hair and will be able to distinguish between human and animal hair. They will further be able to recognize and differentiate specific microscopic features of both the medullary and cuticle patterns.** **In the second part of this unit, students will be taught about natural and synthetic fibers and be able to distinguish between the two. They will perform various physical and chemical identification tests on fibers, such as microscopy, acid/base tests, and burn tests.**
Essential Question(s): 1. What chemical and physical tests are used to analyze hair and fibers? 2. How are hair and fiber evidence used in an investigation?	**Enduring Understanding(s):** **1. Hair and fiber evidence found at a crime scene are used as supporting evidence during an investigation.** **2. Hair and fiber evidence are class evidence.** **3. Hair and fiber evidence have a probative value**

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	NJSLS:
1. Analyze and differentiate various microscopic samples of hair and fibers. 2. Understand why hair and fiber evidence are considered class evidence 3. Describe chemical and physical tests used in analyzing trace evidence. 4. Assess the probative value of hair and fiber evidence. 5. Describe how different types of microscopes are used in analyzing and comparing evidence. 6. Identify unique microscopic patterns of certain organic and inorganic substances. 7. Prepare and present oral and written scientific reports that communicate in a logical sequence the process results and validity of scientific experiments and research	1. HS-ETS1-2 2. HS-LS1-1 3. HS-LS3-3 4. HS-PS1-1

Inter-Disciplinary Connections:

1. Students will measure the diameter of a hair and the medulla.
2. Students will draw the structure of a hair shaft.
3. Describe an actual court case where hair/fiber evidence was used to help solve the crime
4. Calculate the probability of class evidence by utilizing sampling and statistics.
5. Draw microscopic patterns of hairs and fibers

Students will engage with the following text:

1. Forensic Science for High School (2nd Edition) by Ball-Deslich and Funkhouser
2. Hidden Evidence by Owen
3. Criminalistics by Saferstein
4. Any and all articles and case studies that pertain to the current subject matter
5. Any and all instructions to activities and experiments that pertain to the current subject matter

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include, but are not limited to, reading instructions aloud to help students understand the task at hand or the captions under pictures for auditory learners.

Students will write:

In addition to the usual warm ups, closing activities, lab reports, include example(s) of student activities requiring them to write

1. Students will summarize case studies by summarizing the following points:

a. What type of Crime was committed?

b. Who were the victims?

c. What is the Setting (Time and Place)?

d. Name the suspects.

e. List all the evidence that was used to solve the case.

f. Taking the evidence from #5, describe the type of evidence (Testimonial or physical {class or individual})

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

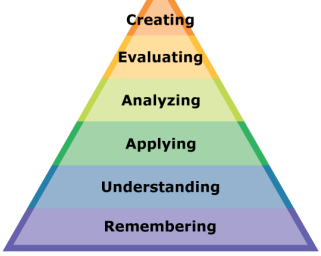
How will students uncover content and build skills.

Students will:

- **Engage in textbook and other reading materials as described above**
- **Actively participate in class discussions both teacher and peer initiated**
- **Utilize a compound light microscope to examine hair/fiber evidence**
- **Work collaboratively with peers on various assignments, labs, and/or projects**
- **Perform chemical tests on different types of fabric**
- **Create various visual aids in the form of posters, diagrams, etc. (see assessment section for further detail)**
- **Perform burn tests on different types of fabric**
- **Utilize their Chromebook to conduct research using internet resources**
- **Utilize the Google classroom for submitting assignments**

Teacher will :

- **Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials**
- **Provide examples of microscopic views of hair/fibers**
- **Assist students with compound light microscope use**
- **Use leading questions to spark classroom discussion**
- **Demonstrate the safe and proper way to conduct chemical and burn tests**
- **Utilize online activities and the Google Classroom for resources**



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class.

For example:
1) Chemical Tests Worksheet
2) Varied and diverse homework assignments for Hair and Fibers

--examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessment

Summative Assessments:

Students will be required to take tests to demonstrate proficiency on the material presented in this unit.

For Example:
1) Chapter Tests for Hair and Fibers

--examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments

Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports.

1) Hair Lab #1 – Students will use a compound microscope to view samples of human hair and determine the medullary pattern.
2) Hair Lab #2 – Students will use a compound microscope to view sample of both human and animal hair for the purpose of comparison Hair Lab 2
3) Burn Testing for unknowns

--examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments

Black Horse Pike Regional School District Curriculum Template ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Forensic Science

Course Number: 049101

Unit 4 - Toxicology

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Forensic Science/ Toxicology** **Grade Level(s):** **11th and 12th**	**Unit Summary:** **Unit 4 : Toxicology** **In this unit students will investigate forensic toxicology. At the end of this unit students will be able to identify, test for, distinguish between, and discuss the legalities surrounding various drugs, alcohol, and other toxins.**
Essential Question(s): **1. How can toxicology reports add value to an investigation?** **2. What effects can toxins have on the human body?**	**Enduring Understanding(s):** **1. In the United States, upwards of 75% of evidence analyzed in forensic laboratories is considered drug related in some way.** **2. All substances can be considered poisons in some way. A correct dosage can make the difference between a medicinal remedy and a lethal toxin.**

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	NJSLS:
1. Classify the various types of illicit drugs and discuss the negative effects of these drugs. **2. Outline the federal penalties for possession and use of controlled substances.** **3. Describe how various testing techniques (color/spot testing, chromatography, microcrystalline,spectrophotometry, mass spectrometry) can be used to identify specific toxins in a body.** **4. Develop a procedure and conduct a laboratory experiment to confirm the presence or absence of toxins in a simulated sample.** **5. Compare and contrast presumptive and confirmatory substance testing.** **6. Present and interpret data using graphs.** **7. Outline the chemical break down of alcohol and explain the associated effects on the human body.** **8. Calculate blood alcohol content (BAC).** **9. Discuss the connection between blood alcohol levels and the law.** **10. Describe how and why breath-testing technology works.** **11. Research and analyze famous cases in history where poisons have been used to commit crimes**	1. HS-ETS1-2 2. HS-LS1-2

Inter-Disciplinary Connections:

1) **History- research and analysis of historical events connect the past to present**
2) **Technology- use of various technological developments to complete testing**
3) **Math- calculation of BAC and toxicity**

Students will engage with the following text:

1. Forensic Science for High School (2nd Edition) by Ball-Deslich and Funkhouser
2. Hidden Evidence by Owen
3. Criminalistics by Saferstein
4. Any and all articles and case studies that pertain to the current subject matter
5. Any and all instructions to activities and experiments that pertain to the current subject matter

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include, but are not limited to, reading instructions aloud to help students understand the task at hand or the captions under pictures for auditory learners.

Students will write:

Students will write a lab report based on a standard format
Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.
Students will write summaries and higher level thinking questions as they utilize Cornell notes.
Students will summarize case studies by describing the following points:
a. What type of crime was committed?
b. Who were the victims?
c. What is the setting? (Time and place)
d. Who are the suspects? (Why?)
e. List all the evidence used to solve the case.
f. Describe the type of evidence (Testimonial or physical- class or individual?)
Students may be asked to write a report on a specific poison outlining its effects, history, social impacts, and discuss any associated cases.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

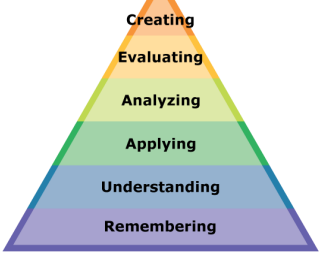
How will students uncover content and build skills.

Students will:

- **Engage in textbook and other reading materials as described above**
- **Students will take Cornell notes using both interactive lecture and independent reading of text resources.**
- **Students will actively participate in class discussion, debates, and Socratic seminars lead by both teacher and peers.**
- **Students will work collaboratively to complete lab activities such as "Spot Testing Lab" and "Detecting Lead" (both from Ball-Desich text)**
- **Students will utilize Chromebooks to complete Web Quest activities such as "Drug Class Identification" and "HowStuffWorks: Breathalyzer"**
- **Students will be asked to interpret and analyze data presented in graphs and case studies.**
- **Students will conduct research and complete current event activities.**
- **Design and conduct laboratory experiments (see example in assessment section)**
- **Complete write to learn activities on the Google Classroom**

Teacher will :

- **Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials**
- **Use leading questions to spark classroom discussion**
- **Utilize Google Classroom to include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners**



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

- **Confirmatory Testing Analysis**
- **Blood Alcohol Content Calculations**
- **Breathalyzer Web Quest**

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessment

Summative Assessments:

Students will be required to take a test(s) to demonstrate proficiency on the material presented in this unit.

- **Toxicology Unit Test**

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments

Performance Assessments:

Students will development and conduct laboratory exercises

1) **OTC Substances Spot Test Lab**
2) **Students may be asked to create a public service announcement discussing illicit drug and/or alcohol**

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments

Black Horse Pike Regional School District Curriculum Template ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Forensic Science

Course Number: 049101

Unit 5 - Serology and DNA

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Forensic Science/ Serology and DNA** **Grade Level(s):** **11th and 12th**	**Unit Summary:** **Unit 5: Serology and DNA:** **In the first half of this unit students will learn how to determine if a provided sample is blood and if so the species of origin. Students will also be able to discuss the components of human blood, discuss and successfully utilize the ABO/Rh blood typing system to characterize simulated human blood samples. Students will also be able to hypothesize the nature of crimes based on blood stain patterns.** **In the second portion of this unit students will review the structure and function of DNA. They will be able to isolate DNA from cells and be able to discuss various ways that DNA can be prepared and an analyzed in a forensic lab. Finally students will learn the history of DNA in the criminal justice system and discuss various legal cases where DNA has been used to both convict and exonerate suspects.**
Essential Question(s): **1. In what way does serological evidence aid in solving a crime?** **2. What conclusions can be drawn from the analysis of bloodstain evidence?** **3. What effects have the advancement of DNA technologies had on the legal system and forensic science?**	**Enduring Understanding(s):** **1. The significance of blood evidence depends on a characteristics relative occurrence in a population, however general blood evidence remains class evidence unless DNA can be extracted.** **2. Forensic investigators can use location, distribution, and patterns of blood stains to help determine the nature of a crime as well as to reconstruct a crime scene.** **3. Advancements in technology have led to new discoveries in DNA structure/sequencing and advanced capabilities in how DNA can be characterized. These advancements can be used to identify and/or clear potential suspects, confirm paternity, and match organ donors. These advancements are also being used to overturn wrongful convictions**

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	NJSLS:
1. Describe and utilize various presumptive tests (luminol and phenolphthalein) to determine if a stain is blood. **2. Differentiate between human and animal blood using precipitin testing and microscopic examination.** **3. Identify and discuss the major components of blood.** **4. Summarize how ABO blood typing was developed, works, and is currently utilized in forensic science.** **5. Analyze unknown (simulated) samples to determine blood type.** **6. Interpret and analyze blood spatter/ stain evidence.** **7. Outline the basic molecular structure and function of DNA.** **8. Isolate and extract DNA from living cells** **9. Identify the steps necessary to create a functional DNA fingerprint** **10. Apply the concepts of RFLP, PCR, and STR's to characterize and analyze DNA samples**	1. HS-ETS1-2 2. HS-PS1-2 3. HS-LS3-3 4. HS-LS1-1

Inter-Disciplinary Connections:

1. **Math – Impact angle calculations and area of convergence determination.**
2. **Technology- use of tools to collect and analyze evidence**
3. **Math- calculate probability of confirming a DNA "match".**
4. **Technology- tools and research used to make analysis faster and more accurate**
5. **History- Legal implications of new technologies in this field**

Students will engage with the following text:

1. Forensic Science for High School (2nd Edition) by Ball-Deslich and Funkhouser
2. Hidden Evidence by Owen
3. Criminalistics by Saferstein
4. Any and all articles and case studies that pertain to the current subject matter
5. Any and all instructions to activities and experiments that pertain to the current subject matter

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include, but are not limited to, reading instructions aloud to help students understand the task at hand or the captions under pictures for auditory learners.

Students will write:

Students will write a lab report based on a standard format
Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.
Students will write summaries and higher level thinking questions as they utilize Chromebooks.

Students will summarize case studies by describing the following points:

a. What type of crime was committed?

b. Who were the victims?

c. What is the setting? (Time and place)

d. Who are the suspects? (Why?)

e. List all the evidence used to solve the case.

f. Describe the type of evidence (Testimonial or physical- class or individual?)

Students will write a short essay defending the pros or cons of the establishment of a DNA Databank

- **See page 366 of Forensic Science for High School (2nd edition)**

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

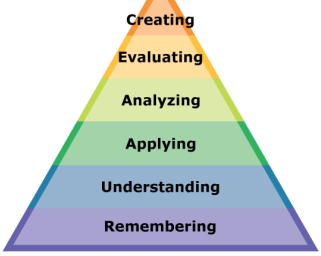
How will students uncover content and build skills.

Students will:

- **Engage in textbook and other reading materials as described above**
- **Students will take Cornell notes using both interactive lecture and independent reading of text resources.**
- **Students will actively participate in class discussion, debates, and Socratic seminars lead by both teacher and peers.**
- **Students will use technology to complete virtual lab activities such as "DNA Virtual Analysis"**
- **Students will complete lab activities such as "Presumptive Blood Testing", "ABO Blood Typing", and "Blood Spatter Analysis"**
- **Students will be asked to interpret and analyze data presented in graphs and case studies.**
- **Utilize Chromebooks to conduct research and complete current event activities.**
- **Design and conduct laboratory experiments (see example in assessment section)**
- **Complete write to learn activities utilizing the Google Classroom**

Teacher will :

- **Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials**
- **Use leading questions to spark classroom discussion**
- **Utilize Google Classroom to include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners**



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

1) **Human Blood Quiz**
2) **Angle of Impact (Blood Spatter) Worksheet**
3) **Area of Blood Drop Convergence Activity**
4) **Vocabulary Quiz**
5) **Virtual Lab Activities**

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessment

Summative Assessments:

Students will be required to take a test(s) to demonstrate proficiency on the material presented in this unit.

1) Blood Chapter Test
2) DNA Chapter Test

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a

template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

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Performance Assessments:

Students will perform a number of Labs and activities, including but not limited to:

1) **Mock Crime Scene**
2) **Lab Activities**
3) **Project Innocence Research paper / presentation**

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Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

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Black Horse Pike Regional School District Curriculum Template ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Forensic Science

Course Number: 049101

Unit 6 - Human Remains and Entomology

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Forensic Science/ Human Remains and Entomology**	**Unit Summary:** **Unit 6: Human Remains and Entomology:** **In this unit, students will become familiar with human remains and the use of entomology in the field of forensic science. Students will explore the structures of the human skeleton and identify the bones that are most valuable in crime scene reconstruction or victim identification. Students will also become familiar with the types and stages of insects that are useful in the forensic analysis of a crime scene. Lastly, students will use provided case information to determine time and nature of death.**
Grade Level(s): **11th and 12th**	
Essential Question(s): **1. How is skeletal evidence used to reconstruct an individual's life and death?** **2. How are insects useful in forensic science?**	**Enduring Understanding(s):** **1. Forensic anthropologists can use bones to determine species, sex, age, and sometimes race of an individual. Remains can also be used to estimate height, provide information on lifestyles, and may aide in determine how and when death occurred.** **2. Insects can help to determine post mortem index (PMI) and provide evidence and other useful information about a specific crime scene.**

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	NJSLS:
1. Describe how the fields of anthropology and entomology have helped investigators determine information about victims and the nature of crime. **2. Distinguish between human and animal bones.** **3. Identify the bones of the human body and contrast male and female human remains.** **4. Determine the age of an individual based on skeletal remains.** **5. Identify and measure the long bones of the human skeleton and use these bones to calculate an estimated height on an individual.** **6. Describe the effects of various forces (compression, torsion, shear, etc.) and trauma (blunt force, projectile, etc.) on human skeletal structures.** **7. Utilize evidence to recreate a crime scene.** **8. Compare rigor mortis, algor mortis, and livor mortis and use them to**	1. HS-ETS1-2 2. HS-LS1-4 3. HS-PS3-4 4. HS-LS1-2 5. HS-PS1-5 6. HS-LS1-1

determine or calculate time of death. **9. Identify and discuss the relationship between insect species and development, and time of death.** **10. Analyze environmental effects on human remains. Outline the basic molecular structure and function of DNA.**	

Inter-Disciplinary Connections:

1. Math- Height and time of death calculations.
2. Social studies- development anthropological methods

Students will engage with the following text:

1. Forensic Science for High School (2nd Edition) by Ball-Deslich and Funkhouser
2. Hidden Evidence by Owen
3. Criminalistics by Saferstein
4. Any and all articles and case studies that pertain to the current subject matter
5. Any and all instructions to activities and experiments that pertain to the current subject matter
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include, but are not limited to, reading instructions aloud to help students understand the task at hand or the captions under pictures for auditory learners.

Students will write:

Students will write a lab report based on a standard format
Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.
Students will write summaries and higher level thinking questions as they utilize Chromebooks and Google Classroom
Students will summarize case studies by describing the following points:
a. What type of crime was committed?
b. Who were the victims?
c. What is the setting? (Time and place)
d. Who are the suspects? (Why?)
e. List all the evidence used to solve the case.
f. Describe the type of evidence (Testimonial or physical- class or individual?)

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

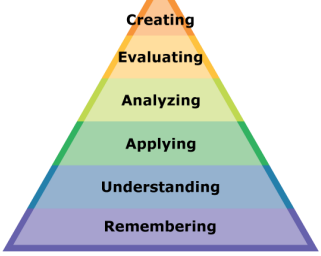
How will students uncover content and build skills.

Students will:

- **Engage in textbook and other reading materials as described above**
- **Actively participate in class discussions both teacher and peer initiated**
- **Work collaboratively with peers on various assignments, labs, and/or projects**
- **Create various visual aids of the human skeleton and insect life cycles.**
- **Design and conduct laboratory experiments (see example in assessment section)**
- **Complete write to learn activities utilizing the Google Classroom**

Teacher will :

- **Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials**
- **Use leading questions to spark classroom discussion**
- **Utilize Google Classroom to include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners**



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

1) **Comparing Human and Animal Bones Worksheet**
2) **Insect Identification Worksheet**
3) **Skeleton Quiz**
4) **Bone comparison worksheet**

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessment

Summative Assessments:

Students will be required to take a test(s) to demonstrate proficiency on the material presented in this unit.

1) **Anthropology Test**

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments

Performance Assessments:

Students will perform various labs and activities in this unit, including, but not limited to:

1) **Mock Crime Scene**
2) **"Sherlock Bones" Lab activity**
3) **Insect Succession in Canada Lab**

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: Pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments

Black Horse Pike Regional School District Curriculum Template ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

FORENSIC SCIENCE

Unit 7: Physical Evidence: Ballistics, Arson, and Police Equipment

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Forensic Science/Introduction to Forensic Science **Grade Level(s):** **11-12**	**Unit Summary**: Unit 7:Physical Evidence: Ballistics, Arson, and Police Equipment In this unit, students will explore the area of physical evidence, with an emphasis on ballistics, arson, and police equipment. The concept of individualized evidence and its importance will be emphasized in this unit. In the first part of this unit, students will examine the structure of a firearm and will be able to distinguish between different types. They will also learn about different types of ammunition and its components. They will further be able to describe how a handgun works and recognize what type of pattern evidence is created by a firearm and its ammunition. In the second part of this unit, students will explore different types of police equipment, such as tasers, vests, and pepper spray, and explain their practical use by police officers. In the last part of the unit, students will investigate the area of arson and explosives and learn about different investigative techniques used to determine how a fire was started. Students will also look at different means of investigation, such as dogs, bees, and robots.
Essential Question(s): **1.** What impact do firearms have on forensic science in the US? **2.** How have technological advances aided and hastened the investigation of crimes that have been committed? **3.** What careers are available in the field of Forensic Science other than CSI?	**Enduring Understanding(s):** 1. Ballistic evidence found at a crime scene is used as individualized evidence that can be linked to the firearm that fired it by using pattern evidence found on the bullet and casing, as well as chemical trace evidence left from the propellant in the ammunition. Ballistic evidence has a high probative value. 2. Various forms of technology aid law enforcement officer and investigators in solving crimes. 3. From one concentration of Forensic Science, there are numerous career options available.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS:**
1. Analyze patterns/markings on bullets created by firearms, 2. Determine firearm identification based on patterns, markings, and bullets, 3. Interpret gunpowder residue results as related to a case, 4. Describe how various types of specialized law enforcement equipment are utilized by officers, 5. Identify various methods that are used in arson investigations.	**1.** HS-ETS1-2 **2**. HS-PS1-2

Inter-Disciplinary Connections:

1. **Calculate kinetic energy of a bullet given speed and velocity of the firearm**
2. **Students will draw the structure of ammunition**
3. **Graph the velocity and trajectory of different firearms**
4. **Describe an actual court case where ballistic evidence was used to help solve the crime**
5. **Graphing assignment on different types of arson**
6. **Research and write an essay on the difference between pepper spray and tear gas**

Students will engage with the following text:

1. **Forensic Science for High School 2nd Edition by Ball-Deslich and Funkhouser**
2. **Hidden Evidence by Owen**
3. **Criminalistics by Saferstein**
4. **Any and all articles and case studies that pertain to the current subject matter.**
5. **Any and all instructions to activities and experiments that pertain to the current subject matter.**

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but are not limited to reading instructions aloud to help students understand the task at hand or the captions under pictures for auditory learners.

Students will write:

In addition to the usual warm ups, closing activities, lab reports, include example(s) of student activities requiring them to write:

1. **Students will summarize case studies by summarizing the following points:**
   a. What type of Crime was committed?
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   e. List all the evidence that was used to solve the case.
   f. Taking the evidence from #5, describe the type of evidence (Testimonial or physical {class or individual})
2. **Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.**
3. **Lab reports in a standard format or conclusion essays may be required for certain lab activities.**

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

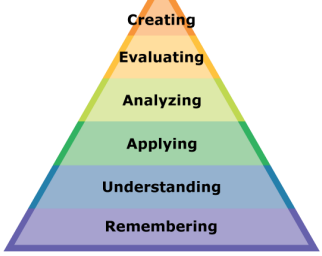
How will students uncover content and build skills.

Students will:

- **Engage in textbook and other reading materials as described above**
- **actively participate in class discussions both teacher and peer initiated**
- **work collaboratively with peers on various assignments, labs, and/or projects**
- **Create various visual aids in the form of posters, diagrams, etc. (see assessment section for further detail)**
- **Conduct research using Chromebook resources**
- **Complete write to learn activities**

Teacher will :

- **Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials**
- **Use leading questions to spark classroom discussion**
- **Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.**



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class.
For example:

1. ***Gunpowder Quiz***
2. ***Tasers Gun, Pepper Spray and Tear Gas***
3. ***Trajectory Lab***

On a daily basis, there are also many class work activities, as well as warm up and closing activities.

-examples of assessments and modified assessments are found in the Forensic Common Folder in Google Drive

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

Students will be required to take tests to demonstrate proficiency on the material presented in this unit.
For Example:

1. ***Ballistics Test***
2. ***Police Equipment Test***

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Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports.

1. **Barcode Ballistics**
2. **Career Project**

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Black Horse Pike Regional School District Curriculum Template ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

FORENSIC SCIENCE

Unit 8: Profiling

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Profiling: Handwriting/Documentation, Criminal, Geographical **Grade Level(s):** **11-12**	**Unit Summary**: Unit 7: Profiling During this unit, students will look more closely at handwriting, criminal behavior, and geographical profiling. Handwriting has twelve specific characteristics that can be used to help convict criminals. To retrieve a sample of known writing, specific requirements are followed to catch consistencies. Chromatography techniques are explored to separate inks from different companies to calculate R_f values. Analysis of money and other documents are covered for comparison purposes. Data collected from previous serial killers has helped to formulate ways to characterize major personality traits for current criminals from the crime scenes. There are fourteen characteristics to create a Criminal Profile Report. This report can be written from looking through someone's garbage. Geographical Profiling is a subcategory of Criminal Profiling. Following the assumption that each crime is a pattern and occur close to the suspect's home, geographical profiling gathers information for easy transportation access to create a map. From this information, officers create teams to surveillance the area for a potential site.
Essential Question(s): 1. How can ransom notes or suicide notes be helpful in an investigation? 2. How do Forensic scientists use criminal and geographical profiling to help solve criminal cases?	**Enduring Understanding(s):** 1. Common individual characteristics are associated with handwriting, documents, and inks. 2. Criminal/Geographical Profiling produces a list of potential characteristics for a perpetrator of a crime to help narrow down a list of suspects or area (work, residence) in the investigation.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable

Learning Target	**NJSLS**
1. Explain the process of forensic handwriting analysis. 2. Compare handwriting samples. 3. Describe the document analysis techniques (handwriting analysis, chromatography, documentation). 4. Explain how to determine if a bill is counterfeit. 5. Identify various stages involved in the criminal profiling method including examination of traits of three main categories	**1.** HS-ETS1-2, **2.** HS-PS1-2

6. Describe the contents of a criminal profiling report	

Inter-Disciplinary Connections:

Measurements using calipers: distance between words, capital and small case letters, and angle of slant
Calculation of R_f values
Creating a ransom note
Examine currency for modern methods used to discourage counterfeiting
Investigate newest methods of handwriting analysis
Historical significance of profiling
Graphing for Geographical Profiling
Probability of the next site for an attack and residence

Students will engage with the following text:

1. **Forensic Science for High School 2nd Edition by Ball-Deslich and Funkhouser**
2. **Hidden Evidence by Owen**
3. **Criminalistics by Saferstein**
4. **Any and all articles and case studies that pertain to the current subject matter.**
5. **Any and all instructions to activities and experiments that pertain to the current subject matter.**

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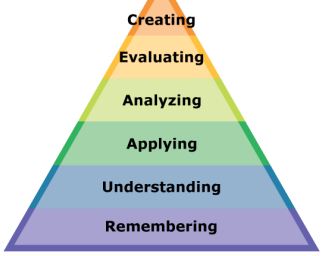

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Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class.

For example:

1. ***DRA using Hidden Evidence***
2. ***FBI & Anthrax Analysis***
3. ***Criminal Profiling Quiz***
4. ***Organized vs. Disorganized Profiling***

On a daily basis, there are also many class work activities, as well as warm up and closing activities.

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Accommodations/Modifications:

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Summative Assessments:

Students will be required to take tests to demonstrate proficiency on the material presented in this unit.

For Example:

1. ***Handwriting Test***

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Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports.

1. **Chromatography Lab**
2. **Mystery Handwriting Analysis**
3. **Serial Killer Project**
4. **Geo Profile project**

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