SIPS II: Introduction to Forensics

One Marking Period
Course Description

The Forensic Science curriculum is designed to build upon science concepts and to apply science to the investigation of crime scenes. Students will learn the scientific protocols for analyzing a crime scene, how to use chemical and physical separation methods to isolate and identify materials, and how to analyze biological evidence. Students will investigate career opportunities within each unit. Students will develop observation and deductive reasoning skills. Students will be able to defend their findings with persuasive arguments supported by evidence.
<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 1</td>
<td>Crime Scene Investigative Techniques</td>
<td>One week</td>
</tr>
<tr>
<td>Unit 2</td>
<td>Forensic Biology</td>
<td>Four weeks</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Forensic Chemistry</td>
<td>Three weeks</td>
</tr>
<tr>
<td>Final Project</td>
<td>Crime scene solution/argument</td>
<td>One week</td>
</tr>
</tbody>
</table>
Educational Technology Standards


- **Technology Operations and Concepts**
  - Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
  - Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.

- **Creativity and Innovation**
  - Apply previous content knowledge by creating and piloting a digital learning game or tutorial.

- **Communication and Collaboration**
  - Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

- **Digital Citizenship**
  - Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
  - Evaluate consequences of unauthorized electronic access and disclosure, and on dissemination of personal information.
  - Compare and contrast policies on filtering and censorship both locally and globally.

- **Research and Information Literacy**
  - Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

- **Critical Thinking, Problem Solving, Decision Making**
  - Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee
Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community, and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2. Apply appropriate academic and technical skills.
Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP3. Attend to personal health and financial well-being.
Career-ready individuals understand the relationship between personal health, workplace performance, and personal well-being; they act on that understanding to regularly practice healthy diet, exercise, and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

CRP4. Communicate clearly and effectively and with reason.
Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others’ time. They are excellent writers; they
master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

**CRP5. Consider the environmental, social and economic impacts of decisions.**
Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

**CRP6. Demonstrate creativity and innovation.**
Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

**CRP7. Employ valid and reliable research strategies.**
Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

**CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.**
Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

**CRP9. Model integrity, ethical leadership and effective management.**
Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to
Career Ready Practices

positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others’ action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management’s actions and attitudes can have on productivity, morals and organizational culture.

CRP10. Plan education and career paths aligned to personal goals.
Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

CRP11. Use technology to enhance productivity.
Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

CRP12. Work productively in teams while using cultural global competence.
Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.
# Differentiated Instruction

Accommodate Based on Students Individual Needs: Strategies

<table>
<thead>
<tr>
<th>Time/General</th>
<th>Processing</th>
<th>Comprehension</th>
<th>Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Extra time for assigned tasks</td>
<td>- Extra Response time</td>
<td>- Precise step-by-step directions</td>
<td>- Teacher-made checklist</td>
</tr>
<tr>
<td>- Adjust length of assignment</td>
<td>- Have students verbalize steps</td>
<td>- Short manageable tasks</td>
<td>- Use visual graphic organizers</td>
</tr>
<tr>
<td>- Timeline with due dates for reports and projects</td>
<td>- Repeat, clarify or reword directions</td>
<td>- Brief and concrete directions</td>
<td>- Reference resources to promote independence</td>
</tr>
<tr>
<td>- Communication system between home and school</td>
<td>- Mini-breaks between tasks</td>
<td>- Provide immediate feedback</td>
<td>- Visual and verbal reminders</td>
</tr>
<tr>
<td>- Provide lecture notes/outline</td>
<td>- Provide a warning for transitions</td>
<td>- Small group instruction</td>
<td>- Graphic organizers</td>
</tr>
<tr>
<td>- Reading partners</td>
<td>- Reading partners</td>
<td>- Emphasize multi-sensory learning</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assistive Technology</th>
<th>Tests/Quizzes/Grading</th>
<th>Behavior/Attention</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Computer/whiteboard</td>
<td>- Extended time</td>
<td>- Consistent daily structured routine</td>
<td>- Individual daily planner</td>
</tr>
<tr>
<td>- Tape recorder</td>
<td>- Study guides</td>
<td>- Simple and clear classroom rules</td>
<td>- Display a written agenda</td>
</tr>
<tr>
<td>- Spell-checker</td>
<td>- Shortened tests</td>
<td>- Frequent feedback</td>
<td>- Note-taking assistance</td>
</tr>
<tr>
<td>- Audio-taped books</td>
<td>- Read directions aloud</td>
<td></td>
<td>- Color code materials</td>
</tr>
</tbody>
</table>
## Enrichment

Accommodate Based on Students individual Needs: Strategies

- Adaption of Material and Requirements
- Evaluate Vocabulary
- Elevated Text Complexity
- Additional Projects
- Independent Student Options
- Projects completed individual or with Partners
- Self-Selection of Research
- Tiered/Multilevel Activities
- Learning Centers
- Individual Response Board
- Independent Book Studies
- Open-ended activities
- Community/Subject expert mentorships
Assessments

Suggested Formative/Summative Classroom Assessments

- Timelines, Maps, Charts, Graphic Organizers
- Unit Assessments, Chapter Assessments, Quizzes
- DBQ, Essays, Short Answer
- Accountable Talk, Debate, Oral Report, Role Playing, Think Pair, and Share
- Projects, Portfolio, Presentations, Prezi, Gallery Walks
- Homework
- Concept Mapping
- Primary and Secondary Source analysis
- Photo, Video, Political Cartoon, Radio, Song Analysis
- Create an Original Song, Film, or Poem
- Glogster to make Electronic Posters
- Tumblr to create a Blog
Interdisciplinary Connections

- Sir Arthur Conan Doyle – Father of Forensics Language Arts – excerpt of Sherlock Holmes novel (10th)

Law Enforcement-

- Rise of police forces in the early 1900s

- DNA –
  - Native Americans connected to Eurasians – National Geographic
    

- Thomas Jefferson & Sally Hemings (10th grade) w/ United States History I (10th)

Fingerprinting-

- History of Fingerprinting & the William West - Will West Case
    
- Document Analysis
  - How historians determine if a document is real or fake
    http://www.pbs.org/opb/historydetectives/feature/real-or-fake/
  - Teacher and student resource:
    Smithsonian Institute
    https://www.si.edu/mci/downloads/RELACT/identifying_the_real_thing.pdf
  - How do new forensic technologies become accepted by law enforcement and courts?

**Grade:** 10  
**Unit 1: Crime Scene Investigative Techniques**  
**Topic: Skills and Procedures**
**Description:** Students will plan and conduct a crime scene search. They will make observations and collect physical evidence for analysis in later lessons. Students will measure and create a crime scene sketch to scale. Students will determine forensic specialties based on categories of evidence collected. Students will develop a theory of crime and motive.

**New Jersey Core Curriculum Content Standards (NJCCCS):**
HS-LS3-3, HS-PS1-2

**Common Core State Standards (CCSS):**
<table>
<thead>
<tr>
<th>NJDOE Student Learning Objective</th>
<th>Essential Questions</th>
<th>Skills</th>
<th>Resources</th>
<th>Sample Activities</th>
</tr>
</thead>
</table>
| Apply concepts of statistics and probability to explain variation and distribution of expressed traits in a population. HS-LS3-3 | What individual traits enable investigators to identify a suspect? | Observation  
Data collection  
Measurement  
Calculate and apply scale factors  
Following procedures  
Deductive reasoning  
Problem Solving | Forensic Science: Fundamentals and Investigations: Bertino  
Ngl.cenage.com  
www.fbi.gov/hg/lab/handbook/forensics.pdf  
Criminalistics: Saferstein  
Forensic Science: James and Nordby | Activity 1-1 Learning to See  
Activity 1-2 You’re an Eyewitness!  
Activity 2-2 Crime-Scene Investigation |
| Construct and revise an explanation for the outcome of a simple chemical reaction based in the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. HS-PS1-2 | What chemical properties of evidence enable investigators to identify the source of the evidence? | Observation  
Data collection  
Measurement  
Calculate and apply scale factors  
Following procedures  
Deductive reasoning  
Problem Solving | Criminalistics: Saferstein  
Forensic Science: James and Nordby  
Forensic Science: Fundamentals and Investigations: Bertino  
Ngl.cenage.com | Activity 2-1 Locard’s Exchange Principle  
Sw classify evidence at a crime scene as to usefulness |
### Unit 1 Vocabulary

<table>
<thead>
<tr>
<th>Deductive reasoning</th>
<th>Means</th>
<th>Locard’s Exchange Principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inference</td>
<td>Motive</td>
<td>Scale factor</td>
</tr>
<tr>
<td>Circumstantial</td>
<td>M.O.</td>
<td>Class characteristics of evidence</td>
</tr>
<tr>
<td>Chain of custody</td>
<td>Alibi</td>
<td>Individual characteristics of evidence</td>
</tr>
</tbody>
</table>

### Unit I Project

**Personal Evidence/Crime Scene Portfolio**

Students will create their own portfolio of the crime scene. This will include observations, crime scene sketch, physical evidence, written scenario of crime, description of suspect, and theory of motive.
<table>
<thead>
<tr>
<th>Grade: 10</th>
<th>Unit 2: Forensic Biology</th>
<th>Topic: Biology Description: The application of concepts and techniques of biology to the testing of evidence from a crime scene and victim. Students will determine time of death and use fingerprints and blood to determine characteristics of suspect.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Jersey Core Curriculum Content Standards (NJCCCS): HS-LS3-3, HSL1-4, HSL5-2</td>
<td></td>
<td></td>
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<tr>
<td>Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. HS-LS1-4</td>
<td>What is a fingerprint and how is it made by the body?</td>
<td>Develop and lift fingerprints, Compare and classify, Using simple microscope</td>
<td>Forensic Science: Fundamentals and Investigation, Bertilo <a href="http://www.crime-scene-investigator.net/SimplifiedGuideFingerprints.pdf">http://www.crime-scene-investigator.net/SimplifiedGuideFingerprints.pdf</a></td>
<td>Activity 6-2 Giant Balloon Fingerprint, Activity 6-6 Fingerprint Matching</td>
</tr>
<tr>
<td>Apply concepts of statistics and probability to explain variation and distribution of expressed traits in a population. HS-LS3-3</td>
<td>How are fingerprints classified and developed?</td>
<td>Calculate %</td>
<td>AFIS.gov <a href="http://www.crime-scence-investigator.net/SimplifiedGuideFingerprints.pdf">http://www.crime-scence-investigator.net/SimplifiedGuideFingerprints.pdf</a></td>
<td>Calculate % of each and compare to national average</td>
</tr>
</tbody>
</table>
### Unit 2 Vocabulary

<table>
<thead>
<tr>
<th>Algor mortis</th>
<th>Karyotype</th>
<th>Wet mount slide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigor mortis</td>
<td>Follicle</td>
<td>Lens</td>
</tr>
<tr>
<td>Postmortem</td>
<td>Medulla</td>
<td>Objective</td>
</tr>
<tr>
<td>Latent</td>
<td>Species</td>
<td>Ocular</td>
</tr>
<tr>
<td>Epidermis</td>
<td>Porous/non-porous</td>
<td>Diaphragm</td>
</tr>
<tr>
<td>Sebaceous glands</td>
<td>Antibodies</td>
<td>Magnification</td>
</tr>
<tr>
<td>Chromosome</td>
<td>Red blood cells</td>
<td></td>
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</tbody>
</table>

### Unit Project

**Biological Evidence Analysis**

Students will produce their evaluations of the biological evidence. They will present the following results: Time of death, results of blood tests, and fingerprint results.

<table>
<thead>
<tr>
<th>Grade: 10</th>
<th>Unit 3: Forensic Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Topic: Chemistry</td>
</tr>
<tr>
<td></td>
<td>Description: The application of the concepts and techniques of chemistry to the testing of evidence and identification of unknown substances.</td>
</tr>
</tbody>
</table>

**New Jersey Core Curriculum Content Standards (NJCCCS):**

| HS-PS1-2, HS-PS1-1, HS-PS1-3 |

**Common Core State Standards (CCSS):**

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Forensic Science: Fundamentals and Investigations: Bertino Ngl.cengage.com  
[www.fbi.gov/hg/lab/handbook/forensics.pdf](http://www.fbi.gov/hg/lab/handbook/forensics.pdf) | Activity 4-1 Microscopic Fiber Analysis  
Activity 15-1 Glass Fracture Pattern Analysis  
Activity 15-2 Glass Density |
<table>
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<tr>
<td>Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. HS-PS1-3</td>
<td>How can we prove which marker was used to write a note? What physical characteristics explain how a solute will move with the solvent? How does polarity affect solubility?</td>
<td>Paper chromatography Rf calculation Solubility determination Experiment design</td>
<td>Criminalistics: Saferstein <a href="https://www.soinc.org/sites/default/files/uploaded_files/crimebusters/Chromatography1.pdf">https://www.soinc.org/sites/default/files/uploaded_files/crimebusters/Chromatography1.pdf</a> Forensic Science: Fundamentals and Investigations: Bertino NgI.cenage.com <a href="http://butane.chem.uiuc.edu/gadams4/chem108sp08/Lab%207(Unknown%20White%20Powder%20Lab).pdf">www.fbi.gov/hg/lab/handbook/forensics.pdf</a></td>
<td>Paper chromatography analysis of note Paper analysis lab Solubility lab</td>
</tr>
</tbody>
</table>
Unit 3 Vocabulary

<table>
<thead>
<tr>
<th>Solute</th>
<th>Solvent</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated/unsaturated</td>
<td>Chromatography</td>
<td>Rf value</td>
</tr>
<tr>
<td>Density</td>
<td>Polarity</td>
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</tr>
</tbody>
</table>

Unit Project

Chemical Evidence Analysis

Students will present their results of the chemical tests they performed. Their results will include identification of the marker used in the note and identification of the powder found at the crime scene. From the glass fragments, students will have determined if the glass was broken from inside or outside and whether the glass found on the suspect matches the glass from the crime scene.

Final Project:

Students will form groups of four and create a crime scene including evidence investigated in this class. Students will then trade crime scenes and analyze evidence. Groups will propose and defend their solution to the class. Class will act as a jury and determine if the presented case has been presented and argued effectively.

Structured Learning Experience:

Assist historical site/museum with preservation. Connects w/ Document & evidence preservation

Collect Oral Histories from Paterson residents – connects w/ Witness Interviewing Skills

Field Trip Ideas:

- NJ Historical Preservation Office
- State Police Museum, NJ