

## CURRICULUM GUIDE

**NAME OF COURSE:** FORENSICS

**COURSE NUMBER:** SCI 404

**WRITTEN / REVISED:** SEPTEMBER, 2011

**LEVEL OF COURSE:** ACADEMIC

**NUMBER OF CREDITS:** SIX (6)

**PREREQUISITES:** "70" IN BIOLOGY/CHEMISTRY/PHYSICS

**GRADE LEVELS OFFERED TO:** 11-12

### **COURSE DESCRIPTION:**

Forensic Science is the application of scientific knowledge and techniques to criminal investigations in order to obtain the evidence needed to solve crimes. The students will discuss the field and laboratory techniques used in actual crime scene investigations. The students will participate in hands-on experiences such as: blood analysis, DNA analysis, fingerprint analysis, and document analysis. The study of hair and fiber will also be major topics covered.

### **COURSE OBJECTIVES:**

When this Forensics course has been completed successfully, students should be able to:

1. Critically think through and formulate problems.
2. Identify and investigate probable solutions.
3. Properly collect and scientifically evaluate data.
4. Record results and draw logical conclusions based on the evidence.
5. Apply data to the given authentic situation(s).
6. Evaluate the most effective means of delivering the information.
7. Communicate the results of the work.

### **CORE CURRICULUM CONTENT STANDARDS ADDRESSED:**

**5.1 - Scientific Practices**

**5.2 - Physical Science**

**5.3 - Life Science**

## **SPECIFIC BEHAVIORAL OBJECTIVES/PROFICIENCIES AND TIME LINES:**

### **Unit #1 - Introduction to Forensic Science**

**Time = 20 Days**

**Goal:** The student will recognize the scope of forensic science and its applications to the criminal justice system.

#### **Objectives:**

1. Define forensic science or criminalistics.
2. Recall the major contributors to the development of forensic science.
3. Give examples of typical crime laboratories as they exist on the national, state and local levels of government in the United States.
4. Describe the services of a typical comprehensive crime laboratory in the criminal justice system.
5. Introduce the student to other areas of forensic science that require expertise in a specialized area.
6. Define physical evidence.
7. Discuss the responsibilities of the first police officer that arrives at a crime scene.
8. Explain the steps to be taken for thoroughly recording the crime scene.
9. Describe proper procedures for conducting a systematic search of crime scenes for physical evidence.
10. Describe proper techniques for packaging common types of physical evidence.
11. List the common types of physical evidence encountered at the crime scene.
12. Explain the difference between the identification and comparison of physical evidence.
13. Define individual and class characteristics. Give examples of physical evidence possessing these characteristics.
14. Explain the purpose physical evidence plays in reconstructing the events surrounding the commission of a crime.

#### **Audio-visuals:**

1. DVD - CSI- Opening Episode
2. PowerPoint presentations on Forensics
3. Movie – “The Bone Collector”

#### **Assignments:**

1. Reading Criminalistics, Chapters 1 and 2
2. Reading Crime Scene, Chapters 1 and 2
3. Write out vocabulary from each chapter
4. Critical Thinking exercises as selected by teacher

#### **Recommended Lab Experiences:**

1. Crime Scene Lab
2. Faces Lab
3. Sherlock Holmes Lab

#### **Evaluation:**

1. Homework(s)
2. Labs
3. Critical Thinking exercises
4. Computer Activities
5. Quiz

## Unit #2 - Forensic Serology

Time = 20 days

**Goal:** The student will gain an understanding of blood, its characteristics and how blood can form patterns in crime scene investigations.

### Objectives:

1. List the A-B-O antigens and antibodies found in the blood for each of the four basic blood types: A, B, AB and O.
2. Explain why agglutination occurs.
3. Explain how whole blood is typed.
4. Describe tests used to characterize a stain as blood.
5. Explain the significance of the precipitin test to forensic serology.
6. Describe how the existence of enzymes and proteins contributes to blood's individualization.
7. Define chromosome and gene.
8. Explain how a Punnett square is used to determine the genotypes and phenotypes of offspring.
9. List the laboratory tests necessary to characterize seminal stains.

### Audio-visuals:

1. PowerPoint presentation on serology
2. DVD- CSI episode on blood
3. Guest speaker on blood
4. Blood poster

### Assignments:

1. Read Chapter 12 on Forensic Serology in Criminalistics
2. Write vocabulary from Chapter 12.
3. Read section on blood from Crime Scene

### Recommended Lab Experiences:

1. Animal Blood Lab
2. Human Blood Typing Lab
3. Blood Impact Angle Lab
4. Case Study of Sam Shepard

### Evaluation:

1. Homework(s)
2. Labs
3. Critical Thinking exercises
4. Computer Activities
5. Quiz

## Unit #3 – Hair and Fiber

Time = 15 Days

**Goal:** The student will gain an understanding of hair and fiber and how they can be used in Forensic Science.

### Objectives:

1. Describe the cuticle, cortex, and medulla of hair.
2. Describe the three phases of hair growth.
3. Explain the distinction between animal and human hairs.
4. List hair features that are useful for comparison of human hairs.
5. Explain the proper collection of hair evidence.

6. Describe the role of DNA typing in hair comparisons.
7. Classify fibers.
8. List the properties of fibers that are most useful for forensic science.
9. Describe the proper collection of fiber evidence.

**Audio-visuals:**

1. PowerPoint presentation on hair and fiber
2. Guest Speaker on hair types
3. DVD- CSI episode on hair, fiber analysis

**Assignments:**

1. Read Chapter 8 on Hair, Fiber and Paint in Criminalistics
2. Write vocabulary from Chapter 8
3. Case Study on Wayne Williams

**Recommended Lab Experiences:**

1. Mammal Hair Comparison Lab
2. Human Hair Lab
3. Fabric and Fiber Lab

**Evaluation:**

1. Homework(s)
2. Labs
3. Critical Thinking exercises
4. Computer Activities
5. Quiz

**Unit #4 -Forensic Toxicology**

**Time = 15 Days**

**Goal:** The student will gain an understanding of how drugs can be identified and used in Forensic Science.

**Objectives:**

1. Develop an appreciation for the role of the toxicologist in the criminal justice system.
2. Describe some of the techniques that forensic toxicologists use for isolating and identifying drugs and poisons.
3. Discuss the significance of finding a drug in human tissues and organs.

**Audio-visuals:**

1. PowerPoint presentation on Forensic Toxicology
2. Guest Speaker on Blood Alcohol content and testing
3. DVD- CSI episode on alcohol

**Assignments:**

1. Read Chapter 10 on Forensic Toxicology in Criminalistics
2. Write vocabulary from Chapter 10

**Recommended Lab Experiences:**

1. Toxicology Report
2. Toxicology Lab
3. Drug Identification Lab

**Evaluation:**

1. Homework(s)

2. Labs
3. Critical Thinking exercises
4. Computer Activities
5. Quiz

#### **Unit #4 - DNA - A New Forensic Science Tool**

**Time = 20 Days**

**Goal:** The student will gain an understanding of DNA, its function and its application to Forensic Science.

#### **Objectives:**

1. Learn the parts of a nucleotide and how they are linked together to make DNA.
2. Understand how DNA strands coil into a double helix.
3. Describe the concept of base pairing as it relates to the double helix structure of DNA.
4. Explain how the sequence of bases along a DNA strand ultimately determines the structure of proteins that are synthesized within the body.
5. Describe how a double-stranded DNA replicates itself and what are the implications for forensic science.
6. Understand how DNA can be cut and spliced into a foreign DNA strand.
7. Describe some commercial applications of this recombinant DNA technology.
8. Explain what is meant by a restriction fragment length polymorphism (RFLP).
9. Describe the process of typing DNA by the RFLP technique and explain how DNA band patterns are interpreted.
10. Explain the technology of polymerase chain reaction (PCR) and how it's applied to forensic science.
11. Understand the difference between RFLP and PCR.
12. Explain the difference between nuclear DNA and mitochondrial DNA.
13. Discuss the application of a DNA computerized database to criminal investigations.

#### **Audio-visuals:**

1. PowerPoint presentation on DNA
2. Internet resources on RFLP and PCR
3. Court TV Episode on DNA evidence

#### **Assignments:**

1. Read Chapter 13 on DNA in Criminalistics
2. Read Chapter 7 on DNA in Crime Scene
3. Write out vocabulary from Chapter 13 and 7
4. DNA crossword puzzle

#### **Recommended Lab Activities:**

1. DNA Scavenger Hunt
2. DNA - Who Done It?
3. DNA Electrophoresis Lab
4. A Case of Abduction
5. DNA Goes To The Races

#### **Evaluation:**

1. Homework(s)
2. Labs
3. Critical Thinking exercises
4. Computer Activities
5. Quiz

## Unit #5 – Questioned Documents

Time = 20 Days

**Goal:** The student will develop an understanding of the role that document analysis plays in forensic science.

### Objectives:

1. Define questioned document.
2. List some common individual characteristics associated with handwriting.
3. List some important guidelines to be followed for the collection of known writings for comparison to a questioned document.
4. Describe the precautions to be taken to minimize deception when a suspect is requested to write exemplars for comparison to a questioned document.
5. List some of the class and individual characteristics of a typewriter.
6. Describe the proper collection of typewritten exemplars.
7. List some of the techniques utilized by document examiners for uncovering alterations, erasures, obliterations and variations in pen inks.

### Audio-visuals:

1. DVD movie - "Catch Me If You Can"
2. Guest Speaker on Forgery / Voice
3. PowerPoint presentation on Document Analysis
4. DVD - CSI Episode

### Assignments:

1. Read Chapter 16 on Document and Voice Examination in Criminalistics
2. Write out vocabulary for Chapter 16
3. Internet Web site on "Questioned Document Analysis" ([www. qdewill.com](http://www.qdewill.com))

### Recommended Lab Experiences:

1. Handwriting Analysis Lab
2. Paper Chromatography Lab
3. Paint Analysis
4. Who Done It Lab
5. Simplified Document Analysis
6. Secret Message Lab

### Evaluation:

1. Homework(s)
  2. Labs
  3. Critical Thinking exercises
  4. Computer Activities
  5. Quiz/Test
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1. Critical Thinking exercises
  2. Computer Activities
  3. Quiz

## Unit #6 - Fingerprints

Time = 20 Days

**Goal:** The student will gain an understanding of fingerprints and how they apply to Forensic Science.

**Objectives:**

1. Name those individuals who have made significant contributions to the acceptance and development of fingerprint technology.
2. Define ridge characteristics.
3. Explain why a fingerprint is a permanent feature of the human anatomy.
4. List the three major fingerprint patterns and their respective subclasses.
5. Explain what is meant by visible, plastic and latent fingerprints.
6. List the techniques for developing latent fingerprints on non-porous objects.
7. Describe chemical techniques for developing prints on porous objects.
8. Describe the proper procedures for preserving a developed latent fingerprint.
9. Explain how a latent fingerprint image can be enhanced by digital imaging.

**Audio-visuals:**

1. PowerPoint presentation on fingerprints

**Assignments:**

1. Read Chapter 14 on Fingerprints in Criminalistics
2. Write vocabulary from Chapter 14
3. Identifying prints
4. Internet research on fingerprints

**Recommended Lab Experiences:**

1. Making and Identifying prints
2. Simplified Fingerprint Analysis Lab
3. Print Portfolio

**Evaluation:**

1. Homework(s)
2. Labs
3. Critical Thinking exercises
4. Computer Activities
5. Quiz

**Unit #7 - Forensic Anthropologists as Crime Scene Members****Time = 15 Days**

**Goal:** The student will gain an understanding of the role a forensic anthropologist plays in forensic science.

**Objectives:**

1. Study the structure of bones to help recreate the scene of a crime.
2. Use bones to help determine age, sex, race of the crime scene victim.
3. Study the structure of teeth and explain their role in identify victims.
4. Identify the different plant types that can be used to help reconstruct the crime scene.
5. Incorporate the study of entomology (the study of insects), into forensic science and explain how it is useful in helping to determine time of death.
6. Describe an autopsy report and what it reveals about the victim and the crime.

**Audio-visuals:**

1. PowerPoint presentation on bones
2. Guest Speaker on Animal bones and prints
3. Guest Speaker on Entomology
4. Guest Speaker on Odontology

**Assignments:**

1. Selected readings from textbooks
2. Significant vocabulary words
3. Special Project on Forensic Biology
4. Internet research

**Recommended Lab Experiences:**

1. Human Skeletal Lab
2. Animal Bone Comparison Lab
3. Scavenger Hunt Lab

**Evaluation:**

4. Homework(s)
5. Labs

**MATERIALS / RESOURCES:**

1. **Criminalistics: An Introduction to Forensic Science - 8<sup>th</sup> Edition, 2004**
2. **Crime Scene - by Larry Ragle, 2002**

**A. STUDENT PROGRESS:**

The evaluation of student progress will be made on the following criteria:

1. Unit Tests/ Quizzes	20-30 %
2. Laboratory Crime Reports	30-40 %
3. Homework	10-20 %
4. Computer Activities	10-20 %
5. Special Projects	10 %

**B. PERIODIC EVALUATION OF OBJECTIVES AND GUIDE:**

1. Next evaluation due June 2014

**C. SPECIAL COURSE POLICIES:**

1. You are part of a CSI team that requires your input and analysis of all the specialists. You do a great disservice to the team by your absence. Be there or hamper the investigation of the crime! Obviously, the crime report quality and grade will suffer.
2. Tests / Quizzes and Lab work must be made up within one week, maximum. Students must make arrangements with the CSI teacher upon returning to school.

**D. DATE MID-TERM / FINAL REVISED**

1. Mid-term – January 2011
2. Final – June 2011

High Point Regional High School’s curriculum and instruction are aligned to the State’s Core Curriculum Content Standards and address the elimination of discrimination by narrowing the achievement gap, by providing equity in educational programs and by providing opportunities for students to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectionate or sexual orientation, gender, religion, disability or socioeconomic status.