

# COURSE OF STUDY FORENSIC SCIENCE

Fall 2005

Mary Villani

<u>Week Of</u>	<u>Topic</u>
Sept. 12	<ol style="list-style-type: none"><li>1. Organization and Introduction to Forensic Science</li><li>2. The History and Development of Forensic Science</li><li>3. The Functions of the Forensic Scientist</li><li>4. Forensic Specialists</li><li>5. Lab: Dancing Men</li></ol>
Sept. 19	<ol style="list-style-type: none"><li>1. Physical Evidence</li><li>2. Types of Physical Evidence</li><li>3. The Significance of Physical Evidence</li><li>4. The Collection and Preservation of Physical Evidence</li><li>5. Case studies</li><li>6. Lab: Crime Scene Investigation</li></ol>
Sept. 26	<ol style="list-style-type: none"><li>1. Processing the Crime Scene</li><li>2. The Legal Considerations at the Crime Scene</li><li>3. Aspects of Evidence Collection</li><li>4. Preservation of Physical Evidence</li><li>5. Rough and Smooth Sketches</li><li>6. Analysis of Physical Evidence<ul style="list-style-type: none"><li>. chromatography</li><li>. spectrophotometry</li><li>. mass spectrophotometry</li></ul></li><li>7. Establishing a Chain of Custody</li><li>8. The Admissibility of Evidence</li><li>9. The Role of the Expert Witness</li><li>10. The organization of the crime lab</li><li>11. Lab: Rolling Fingerprints</li></ol>
Oct. 3	<ol style="list-style-type: none"><li>1. The History of Fingerprinting</li><li>2. The Fundamental Principles of Fingerprints</li><li>3. Lab: Rolling Fingerprints and Classification of Prints</li></ol> <p>*** To be continued into single periods</p>

of the following week.

**Oct.10**

- 1. The Classification of Fingerprints**
- 2. Automated Fingerprint Identification Systems**
- 3. Digital Imaging for Fingerprint Enhancement**
- 4. Methods of Detecting, Preserving and Developing Fingerprints**
- 5. Labs:**
  - a) Rolling and Classification of Prints**  
\*\*\* To be continued from week before
  - b) Dusting and Lifting of Latent Prints**  
\*\*\* To be continued into single period classes of the following week.

**Oct.17**

- 1. Lab: Dusting and Lifting of Latent Prints**  
To be continued from week before
- 2. Ear prints**
- 3. Lab: The Chemical Development of Latent Print Prints**  
\*\*\* To be continued into single period classes during the following week

**Oct. 24**

- 1. Lab: The Chemical Development of Latent Prints (continued)**
- 2. The Morphology of Hair**
- 3. Hair as Physical Evidence**
- 4. Collection of Hair Evidence**
- 5. Tools Used for the Microscopic Examination of Hair**
  - . **Compound Microscope**
  - . **Stereomicroscope**
  - . **Polarizing Microscope**
  - . **Microspectrophotometer**
  - . **The Scanning Electron Microscope**
- 6. Identification and Comparison of Hair**
- 7. Lab: Examination and Comparison of Human Hair**  
\*\*\* To be continued into single period classes during the following

**Oct. 31**

- 1. Lab: Examination and Comparison of Human**

**Hair (continued)**

- 2. Lab: Hair Scale Preparation and Examination**
- 3. Lab: Animal Hair Examination and Unknowns**

**\*\*\* To be continued into single period classes of the following week**

**Nov. 7**

- 1. Lab: Animal Hair Examination and Unknowns (continued)**
- 2. Fibers as Physical Evidence**
- 3. Wayne Williams Case**
- 4. Lab: Microscopic Examination of Fibers**

**Nov.14**

- 1. Lab: Synthesizing and Dying Nylon Fibers (single period)**
- 2. Collecting, Preserving and Analyzing Paint Evidence**
- 3. Auto Accidents**
- 4. Hit and Run Accidents**
- 5. The Collection and Preservation of Glass Evidence**
- 6. Lab: Tire Impressions and Casts**

**Nov. 21**

- 1.The Chemistry of Fire**
- 2. Accelerants**
- 3. Point of Origin**
- 4. Arson Investigations**
- 5. The Collection and Preservation of Arson Evidence**
- 6. Arson Explosions**
- 7. Analysis of Flammable Residues**
- 8. Lab: Hunt for Serial Arsonists**

**Nov. 28**

- 1. The Psychological Profiles of Killers**
  - a. Profiles of Serial Arsonists**
  - b. Profiles of Mass Murderers**
  - c. Profiles of Child Abusers**
- 2. Psychic Sleuthing**
- 5. Lab: Who Shot JFK?**

**Dec. 5**

- 1. Opposing Viewpoints - Who Shot JFK?**
  - a. JFK and the Mob**
  - b. JFK and Cuba**
  - c. The U.S. in the 1960s**

- 2. The Murder of RFK
  - 3. The Murder of Martin Luther King
- Dec. 12**
- 1. The Collection and Preservation of Firearm Evidence
  - 2. Bullet Comparisons
  - 3. Cartridge Cases
  - 4. Gunpowder Residues
  - 5. Primer Residues on Hands
  - 6. Serial Number Restoration (Demo)
- Dec. 19**
- 1. The Coroner vs. The Medical Examiner
  - 2. Pathologist vs. the Forensic Pathologist
  - 3. The Medical Autopsy vs. The Forensic Autopsy
  - 4. Establishing the Cause of Death
  - 5. Establishing the Circumstances of Death
  - 6. Establishing the Time of Death
  - 7. Stages of Decomposition
    - . Rigor Mortis
    - . Livor Mortis
    - . Algor Mortis
    - . Potassium Levels in Ocular fluid
  - 8. Lab: The Science of Murder
  - 9. Lab: Confessions of a Medical Examiner
- Dec. 26**
- WINTER VACATION**
- Jan. 2**
- 1. Unnatural Deaths: Case Studies
  - 2. Unsolved Mysteries
  - 3. Lab: The Best of the Forensic Autopsy
- Jan. 9**
- 1. Forensic Entomology
  - 2. Insect Life Cycles
  - 3. Time Required for Stage Development
  - 4. Climate and Weather Conditions
  - 3. Using Insects to Solve Crime
    - . Establishing the Time of Death
    - . Establishing the Circumstances Surrounding the Crime
  - 4. Lab: Insects at the Crime Scene
- Jan. 16**
- Mid-year Exams**

**COURSE OF STUDY  
FORENSIC SCIENCE**

**Spring 2006**

**Mary Villani**

<b><u>Week of</u></b>	<b><u>Topic</u></b>
<b>Jan. 30</b>	<b>1. Review of Mid-year Exam 2. Animal versus Human Skeletal Remains 3. Forensic Anthropology 4. Determining the Origin of Bones 5. Aging Skeletal Remains 6. Race Determination 7. Sex Determination 8. Lab: Butch and Sundance</b>
<b>Feb. 6</b>	<b>1. Grouping Sub grouping and Individualizing Skeletal Remains 2. Skeletal Injuries 3. Production of Foot Casts and Foot Impressions 4. Lab: Snow Prints (weather permitting) 5. Lab: Skeletal Measurements</b>
<b>Feb. 13</b>	<b>1. Skeletal Measurements continued 2. Skeletal Remains and the Cause of Unnatural Deaths 3. Forensic Imaging 4. Facial Reconstruction and the Forensic Artist 5. Lab: The Mystery of Anastasia Romanoff</b>
<b>Feb. 20</b>	<b>MID-WINTER BREAK</b>
<b>Feb. 27</b>	<b>1. Forensic Odontology 2. Mammalian and Human Teeth 3. Characteristics of Teeth 4. Teeth Alignment</b>

5. Dental Records
6. Dental Casts
7. Dental Comparisons
8. Analysis of Bite Marks
9. Case Studies
10. Guest speakers (double period)

**March 6**

1. The Structure of DNA
2. How DNA Works
3. DNA Replication
4. Recombinant DNA : Cutting and Splicing DNA
5. The Collection and Preservation of Biological Evidence for DNA Analysis
6. DNA Typing
7. Nuclear DNA versus Mitochondrial DNA
8. Mitochondrial DNA and Missing Persons/MIA's
9. DNA at the Crime Scene
10. DNA Landmark Cases
11. The Combined DNA Index System
12. DNA Testing and the Judicial System
13. Distance Learning with John Jay College
14. The Ethics of DNA Testing
15. DNA Testing and Rights of Privacy
16. Lab: Murder Rape and DNA

**March 13**

1. DNA Profiling Paper Simulation (RFLP)
2. DNA Isolation and Extraction
3. Lab: DNA Spooling

**March 20**

1. Testing for DNA
2. Casting and Loading Gels Practice
3. Lab: Adding Restriction Enzymes and Dyes to Samples

**March 27**

1. Electrophoresis
2. Southern Blotting
3. Hybridization
4. Lab: Loading Wells and Electrophoresis

**April 3**

1. Observation and Analysis of RFLP test results
2. PCR Testing
3. Plant DNA versus Human DNA
4. Lab: Isolation of Squamous Cell DNA ( double period)

5. Preparation of PCR tubes (single period)
6. Amplification of DNA in Thermal Cyclor (teacher)

**April 10**

1. The Human Genome Project
2. Case Studies – using DNA typing by PCR
3. PCR Testing for Forensic Investigations versus PCR Testing for Genetic research

**April 11**

1. PCR Testing in the Forensic Science Lab Versus PCR Testing in the classroom
2. Lab: Preparation of Cast Gels (single period)
3. Lab: Loading DNA Samples, Electrophoresis and Staining of Gels (double period)+

**April 13-21**

**SPRING RECESS**

**April 24**

1. Observation of Lab Results
2. Human Mitochondrial DNA
3. Forensic Investigations With Mitochondrial DNA Technology – Case Studies
3. Lab: DNA Isolation from Hair Sheaths (double period)
5. Lab: Preparation of PCR tubes (single period)
6. Amplification of DNA in Thermal Cyclor (teacher)

**May 1**

1. Lab: Preparation of Cast Gels (one period)
2. Lab: Loading, Electrophoresis and staining gels (double period)+

**May 8**

1. Observations of Lab Results
2. Drugs
3. Drug Dependence
4. Narcotic Drugs
5. Hallucinogens
6. Depressants
7. Stimulants
8. Anabolic Steroids
9. Drug Identification
11. Examination of Organs and Tissues
10. Body Fluids- Collection and Preservation of Drug Evidence

**12. Lab: Aspirin Determination with Spectrophotometry (one single and one double period)+**

**May 15**

- 1. Forensic Toxicology**
- 2. Toxicology and Alcohol**
- 3. The Role of the Toxicologist**
- 4. Techniques Used in Toxicology**
  - . Thin Layer**
  - . Gas Chromatography**
  - . Immunoassay**

**May 22**

- 1. Blood Morphology and Blood Chemistry**
- 2. Blood Stain Patterns**
- 3. Species Test**
- 4. The Grouping, Sub grouping and Individualization of Blood Stains**
- 5. Lab: Blood Typing – Who Done It?**
- 6. Blood Alcohol Levels**

**May 29**

- 1. Document Examination**
- 2. Print and Script**
- 3. Typewriting Comparisons**
- 4. Photocopier, Printer, Fax Examination**
- 5. Ink Examination and Extraction**
- 6. Alterations Erasures and Obliterations**
- 7. Lab: Document Examination**
- 8. Lab: Handwriting Comparisons**
- 8. Term Papers due**

**June 5**

- 1. The Forensic Psychiatrist versus The Document Examination Lab**
- 2. Forged Documents and the Law**
- 3. Counter fit money and the Law**
- 4. TIPS Web Quest Project presentations**

**June 12**

- 1. Legal Procedures – Discovery, Jury Selection, Shadow Juries, Insanity Pleas**
- 2. Trials of the Century**
- 3. Mock Trials**
- 4. Lab: Mock Trial Presentations**

**June 26**

**Shadow Program**