chs5503b - Topics in Forensic Science

Carrie Whitcomb

Detailed Syllabus

Introduction

This course will explore and review various aspects of forensic science and the principles involved in processing various types of evidence for reporting and testimony in court. Ethics and professionalism will be discussed and the various sub-disciplines in forensic science will be explored, including the newest one, which involves digital and multimedia evidence. Participation in this course will reveal the appropriate application of scientific principles, methods and the legal aspects of forensic science as it relates to the proper identification, collection, storage, examination, evaluation and reporting of findings, related to various types of evidence. Participation will give the students a “view” from the forensic scientists’ perspective.

This class is one of the four required classes for students in the UCF Graduate Certificate in Computer Forensics or the Continuing Education Certificate in Computer Forensics.

Required Texts :

There is no *required* text for this course. Online resources will supplement lecture materials.

Optional Texts :

Criminalistics : An Introduction to Forensic Science. Robert Saferstein. Pearson Prentice Hall - ISBN 0-13-111852-8

Instructor

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Bachelor of Science in Zoology with a minor in Chemistry, University of Kentucky, Lexington, 1967
Master of Science in Forensic Science, George Washington University, Washington, DC, 1976.
Curriculum vitae is located on WebCT

Course Objectives

1. To give computer forensic students an overview of the other forensic science disciplines
2. To assist in their understanding and overall knowledge of other types of evidence that may assist them in processing a scene and collecting digital evidence without destroying other evidence and also includes:
   a. Science and relationships
   b. What it takes to be a forensic scientist
   c. The many types of evidence
   d. The probative value of evidence
   e. Ethics and professionalism
   f. Expert court testimony
   g. The history of digital evidence

Module Descriptions

Module 1a - Introduction to Forensic Science

Objectives

1. Define forensic science and forensic evidence
2. Delineate the goals of forensic analysis
3. Detail how forensic science is organized into major and minor specialties
4. Explain chain of custody and its importance in a court of law
5. Explain the Federal Rules of Evidence and their relationship to forensic evidence
6. Explain the expectations, qualifications, and requirements of the forensic profession as a career

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Module 1b - History of Forensic Science

Objectives

1. Explain the origins of forensic science
2. Delineate the differences between testimonial and physical evidence
3. Detail how forensic science split into its current specialties
4. Identify the scientists and others responsible for the development of forensic science
5. Identify the major concepts and discoveries of these historical figures
6. Explain how public opinion influences the practice of forensic science
7. Delineate the concepts inherent in the scientific method and its application to the forensic sciences
8. Define the roles of the forensic scientist
9. Identify the major concepts involved in forensic analysis
10. Define the proper actions of the forensic expert in the courtroom
11. Identify and understand the two major court cases dealing with the admission of forensic evidence into court

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Module 2 - Professional Ethics in the Forensic Science

Objectives

1. Understand and define the concept of professional ethics
2. Understand the five ethical principles
3. Understand the values and principles of the major schools of ethics theory
4. Understand how ethics separate a profession from an occupation
5. Understand the ethical challenges faced by the forensic scientist

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Module 3a - Biological Evidence - Serology

Objectives

1. Identify the components of human blood and their relevance to forensic analysis
2. Understand the concept of blood typing, and identify the various types of blood
3. Identify the types of stains that are produced by blood
4. Understand how blood spatter is analyzed and its impact on the re-creation of the commission of a crime
5. Describe how blood should be collected from a crime scene, victim, and suspect
6. Describe the characteristics of semen that are used in forensic analysis
7. Identify the techniques used in detecting the presence of semen on a crime scene

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Module 3b - Biological Evidence - Forensic Anthropology

Objectives

1. Understand how the age of a deceased can be determined through the use of forensic anthropology
2. Understand how the race and gender of a deceased can be determined through the use of forensic anthropology
3. Understand how the height and other physical characteristics of a deceased can be determined through the use of forensic anthropology
4. Understand how various types of trauma can be detected on bone evidence

5. Understand how a deceased can be identified through the unique characteristics left behind on bones by various diseases and conditions
6. Understand other characteristics of bone evidence that can be used in the identification of a deceased

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Module 3c - Biological Evidence - DNA

Objectives

1. Identify the scientists who discovered the molecular structure of DNA
2. Describe the molecular structure of DNA
3. Identify the components of the DNA molecule
4. Identify what cellular structures contain DNA
5. Identify how small quantities of DNA can be replicated into samples large enough for analysis
6. Identify the four major methods of DNA analysis
7. Identify where in the human body DNA can best be collected
8. Describe how DNA should be collected from a crime scene, victim, and suspect

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Module 3d - Biological Evidence - Toxicology

Objectives

1. Identify the purposes of forensic toxicology
2. Identify the types of substances that can be identified by a toxicologist
3. Identify the scientific techniques and equipment used in toxicology analysis
4. Identify the human factors that must be taken into account to make a determination of the toxicity of a substance in the body

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Module 3e - Biological Evidence - Forensic Entomology

Objectives

1. Understand the role of forensic entomology in the investigation of criminal activities
2. Identify the insects of importance to forensic entomologists
3. Identify the stages of development of such insects
4. Understand the proper collection and preservation of insect evidence
5. Describe the climatic conditions that must be recorded at a crime scene that have an impact on insect evidence
6. Understand what information forensic entomology can provide at the crime scene

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Module 4a - Physical Evidence - Fire and Explosions

Objectives

1. Identify the chemical reactions involved in fires
2. Identify the class and types of chemicals used in arsons
3. Identify the focus of the search of a fire scene
4. Identify the proper methods of the collection and preservation of fire evidence
5. Identify the major equipment used in the analysis of fire evidence
6. Identify the major types of explosives
7. Identify the major chemical reactions involved in an explosion
8. Differentiate the characteristics of high and low explosives
9. Identify the major high and low explosive compounds
10. Identify the proper methods of the collection and preservation of explosives
11. Identify the major equipment used in the analysis of explosives

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Module 4b - Physical Evidence - Ballistics and Firearms

Objectives

1. Identify the components of a firearm whose marks can be used in identification
2. Identify the components of a bullet or shell that can be used in identification
3. Identify the laboratory equipment used in the analysis of bullets and casings
4. Identify the characteristics of a contact wound

5. Identify the characteristics of a non-contact wound
6. Identify the techniques used in the collection of gun shot residue
7. Identify the proper way to collect, mark and package firearms and bullets

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Module 4c - Physical Evidence - Chemistry

Objectives

1. Identify the states of matter
2. Identify the two major branches of chemistry
3. Describe the theory of chromatography
4. Describe the technique of gas chromatography
5. Describe the technique of high performance liquid chromatography
6. Describe the technique of thin layer chromatography
7. Explain electrophoresis
8. Describe how mass spectrometry is used in chemical analysis

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Module 4d - Physical Evidence - Glass and Soil Analysis

Objectives

1. Identify the characteristics of glass that are used for identification and analysis
2. Identify the types of glass that may be submitted for forensic analysis
3. Understand how the refractive index of glass can be used in identification and analysis
4. Identify the types of fractures that can occur in glass
5. Understand the methods of collection and preservation of glass
6. Identify the characteristics of soils that are used for identification and analysis
7. Understand the methods of collection and preservation of soil

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Module 4e - Physical Evidence - Fingerprints

Objectives

1. Describe the system of identification that served as the precursor to fingerprints
2. Describe the three principles of fingerprints
3. Describe the three classes of ridge patterns
4. Differentiate between the characteristics of patent, plastic, and latent fingerprints
5. Describe the AFIS system
6. Identify the major techniques of the collection of latent fingerprints
7. Describe the methods of preservation and collection of fingerprints

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Module 4f - Physical Evidence - Questioned Documents and Handwriting

Objectives

1. Define a questioned document
2. Describe the major concepts related to handwriting analysis
3. Identify the major determinations made by a typescript analysis
4. Identify the major types of changes made to documents
5. Explain the characteristic of inks that can be used to detect changes in documents
6. Explain indented writings and the methods for its analysis

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Module 4g - Physical Evidence - Toolmarks and Impressions

Objectives

1. Define a toolmark
2. Describe how a toolmark is made on an object or at a crime scene
3. Describe the technique used in the analysis of toolmarks
4. Describe the various types of other impressions that may be found at a crime scene
5. Describe the techniques used in the collection and preservation of toolmarks and impressions
6. Describe the difference between class and identifying characteristics
7. What is the major identifying characteristic that is of forensic value

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Module 4h - Physical Evidence - Trace Evidence

Objectives

1. Identify the major types of trace evidence
2. Understand the theory of transference
3. Describe why trace evidence is of forensic value
4. Identify the components and characteristics of hair used in identification
5. Identify the techniques used in the collection and preservation of hair
6. Identify the components and characteristics of fibers used in identification
7. Identify the techniques used in the collection and preservation of fibers
8. Identify the components and characteristics of paint used in identification
9. Identify the techniques used in the collection and preservation of paint

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Module 5a - Digital Evidence - Computer Forensics

Objectives

1. Determine the need for computer forensics in an organization
2. Identify situations where an investigation will need computer forensics support
3. Identify and describe the major functional areas of computer forensics
4. Identify the types of devices that require forensic analysisx
5. Identify the basic concepts of computer forensics as a discipline

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Module 5b - Digital Evidence - Digital Audio

Objectives

1. Describe the four techniques of video enhancement and information retrieval
2. Describe the three types of digital image processing
3. Identify the characteristics of images that must be eliminated or altered for proper image enhancement

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Module 5c - Digital Evidence - Digital Video

Objectives

1. Describe the techniques used in the analysis of voices and sounds
2. Describe the three parameters of a voiceprint
3. Identify the seven classification categories of recordings per the American Board of Recorded Evidence

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Module 6 - Courtroom Testimony

Objectives

1. Identify the types of courtroom testimony
2. Understand the Federal Rules of Evidence that cover testimony
3. Understand the trial sequence of testimony
4. Understand the voire dire process
5. Understand how to prepare for testimony

Module 7 - The Future of Forensic Science

Objectives

1. Describe the judicial trends that will have an effect on the forensic sciences
2. Describe how advances in technology affect the forensic sciences
3. Describe how changing public attitudes, trends and opinions affect the forensic sciences
4. Describe how the political climate affects the forensic sciences