

UMB CURE Connections (C2)

Forensic Science Syllabus

2020-2021

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Track Overview

Course Description and Track Rationale:	Forensic Science combines the diverse fields of physical and biological sciences to recreate the events surrounding a crime. Within the C2 Forensic Science track, scholars will explore high-profile case studies and conduct various investigations that will immerse them in topics such as fingerprint analysis, ballistics, hair and fiber analysis, toxicology, DNA testing, and blood spatter as a way to explore how chemistry is used in the medical field.
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Course Learning Objectives

After completing this course, students will be able to:

- Compare different careers within the field of forensic science.
- Demonstrate how to gather, process and document evidence found at a crime scene.
- Conduct various lab investigations to analyze evidence.
- Make connections between forensic science and chemistry.
- Reconstruct events using evidence in order to solve a crime.

Unit Learning Objectives

Module 1: Introduction to Forensic Science

After completing this module, students will be able to:

- Define forensic science and list the major disciplines it encompasses
- Examine the different careers that fall under forensic science.
- Describe Locard's Exchange Principle and how it applies to a crime scene.

Module 2: Crime Scene Investigation

After completing this module, students will be able to:

- Distinguish between the Seven S's in Crime Scene Investigation.
- Differentiate between physical evidence and circumstantial evidence.
- Identify different types of physical evidence found at a crime scene.
- Describe the use and information obtained from physical evidence found at the crime scene.

Module 3: Processing the Crime Scene

After completing this module, students will be able to:

- Record exact measurements in the layout of a crime scene.
- Sketch a crime scene using digital tools.
- Demonstrate understanding of forensic photography by taking photographs of “evidence” and completing written records.

Module 4: Physical Evidence Analysis

After completing this module, students will be able to:

- Explain how hair can be used in a forensic investigation.
- Compare and contrast various types of fibers through physical and chemical analysis.
- Investigate ink chromatography to match documents or stains found at a crime scene to an object belonging to a suspect.
- Identify unknown substances by utilizing a series of chemical tests of the chemical and physical properties of substances.

Module 5: Fingerprinting and DNA Profiling

After completing this module, students will be able to:

- Analyze the common ridge characteristics of a fingerprint.
- Identify and compare the three major fingerprint patterns and their respective subclasses.
- Explain how DNA is unique to one individual and how it can be used to identify one person with reasonable certainty.
- Argue how DNA evidence can be used to exonerate the wrongly accused using the Innocence Project.

Module 6: Blood and Blood Spatter

After completing this module, students will be able to:

- Explain the composition of blood.
- Describe the history of the use of blood and blood-spatter analysis in forensic science.
- Compare and contrast medium and high velocity impact blood spatter.
- Compare and contrast 90° angle and non-90° angle blood spatter.
- Conduct a blood spatter analysis.

Module 7: Soil Examination and Forensic Geology

After completing this module, students will be able to:

- Describe how various environmental factors may influence the estimated time of death.
- Understand the importance of soil in forensic cases.

- Analyze soil in order to compare soil samples and match them to an “unknown” sample.

Module 8: Forensic Entomology

After completing this module, students will be able to:

- Describe the role of a forensic entomologist.
- Describe the stages of decomposition in a corpse.
- Explain how time of death estimates may be linked to insect evidence.
- Identify forensically important insects.
- Describe how various environmental factors may influence the estimated time of death.

Module 9: Forensic Toxicology

After completing this module, students will be able to:

- Describe the role of a forensic toxicologist.
- Compare and contrast the various types of drugs and toxic substances encountered in an investigation.
- Analyze how various toxic substances effect the body.

Module 10: Forensic Odontology

After completing this module, students will be able to:

- Explain how forensic odontologists identify human skeletal remains.
- Identify two different types of forensic examinations that forensic odontologists are asked to perform.
- Compare and analyze various sets of bite marks.

Module 11: Forensic Anthropology

After completing this module, students will be able to:

- Explain how forensic anthropologists identify human skeletal remains.
- Describe how age determination may be based upon an analysis of bone.
- Differentiate between various bone structures by race.
- Explain various methods used to identify human remains.
- Create a digital presentation comparing the work of forensic anthropologists to what is shown on television.

Module 12: Forensic Psychology

After completing this module, students will be able to:

- Evaluate psychological evidence regarding eyewitness memory and the methods involved in interviewing techniques.
- Conduct a self-analysis of eyewitness implicit bias.
- Describe the types of evaluations a forensic psychologist may be asked to perform.
- Develop a profile of a criminal based on their history and crimes.
- Analyze criminals based on psychological theories.

Module 13: Firearms and Ballistics

After completing this module, students will be able to:

- Describe how forensic engineers reconstruct an event.
- Understand the importance of ballistics analysis in forensic science.
- Explain how various types of impressions can be used as trace evidence.
- Compare various tool marks with the instrument used to create same.
- Discuss the role of ballistics recovery and examination at a crime scene.

Module 14: Arson

After completing this module, students will be able to:

- Discuss characteristics and varieties of arson and describe the unique challenges of investigating arson.
- Identify various motives for arson and discuss how establishing motive may be useful in an investigation.
- Examine an arson case and investigate signs of arson.

Module 15: Forensic Science Crime Scene Project

After completing this module, students will be able to:

- Develop and create a physical model for their own crime scene.
- Reconstruct crime scenes based on physical evidence.
- Demonstrate how to sketch a crime scene.
- Distinguish between physical and circumstantial evidence.
- Demonstrate how to collect different types of evidence.
- Identify how each piece of evidence links to a suspect

Course Schedule

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 1 Starts _____	Introduction to Forensic Science	<ul style="list-style-type: none"> • Lesson 1.1 – What is Forensic Science? • Introduction to Forensic Science Word Study • Forensics Preconceptions Digital Collage • BCPD Forensics Lab Tour and Q&A session • Jeff MacDonald Case Study • Forensics Careers Research and Wanted Ad • Career Roadmap and Career Snapshot: Forensic Artist • Digital Escape Room: The Case of Camp Crystal Cove (Intro to Forensics Science) • Discussion Post 1.1 – Locard's Exchange Principle
Module 2 Starts _____	Crime Scene Investigation	<ul style="list-style-type: none"> • Lesson 2.1 – The 7 S's of Crime Scene Investigation • Doodle-It! Notes: 7 S's of Crime Scene Investigation • OJ Simpson Case Study • Digital Escape Room: The Case of the Murdered Millionaire Seven S's of Crim Scene Investigation • Physical vs. Circumstantial vs. Trace Evidence Activity • Discussion Post 2.1
Module 3 Starts _____	Processing a Crime Scene	<ul style="list-style-type: none"> • Lesson 3.1 – How To: Forensic Sketching (with notes) • Digital Crime Scene Practice Activity • Digital Crime Scene Sketches • Lesson 3.2 – How To: Forensic Photography (with notes) • Crime Scene Photography Activity • Document Your Own Crime Scene • Discussion Post 3.1

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 4 Starts _____	Physical Evidence Analysis	<ul style="list-style-type: none"> • Lesson 4.1 – Physical Evidence Analysis • Wayne Williams Case Study • Hair and Fiber Analysis • Ink Chromatography Lab • Mysterious Powder Lab • Discussion Post 4.1
Module 5 Starts _____	Fingerprinting and DNA Profiling	<ul style="list-style-type: none"> • Lesson 5.1 – Fingerprinting • Doodle-It! Notes: Fingerprinting • The Night Stalker Case Study • CSI Science: Get the Prints! Investigation • Discussion Post 5.1 • Lesson 5.2 – DNA Profiling • DNA Module Packet • Create a DNA Fingerprint Activity • The Innocence Project – Research Assignment and Digital Gallery Walk • John Dillinger Case Study • Discussion Post 5.2
Module 6 Starts _____	Blood and Blood Spatter	<ul style="list-style-type: none"> • Lesson 6.1 – Blood and Blood Spatter • Blood Spatter Detectives Investigation • Discussion Post 6.1

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 7 Starts _____	Soil Analysis and Forensic Geology	<ul style="list-style-type: none"> • Lesson 7.1 – Soil Analysis • Janice Dodson Case Study • Soil Analysis Investigation • Discussion Post 7.1
Module 8 Starts _____	Forensic Entomology	<ul style="list-style-type: none"> • Lesson 8.1 - Forensic Entomology • Entomology Guided Text with Questions • Forensic Entomology Student-Driven Projects • Discussion Post 8.1
Module 9 Starts _____	Forensic Toxicology	<ul style="list-style-type: none"> • Lesson 9.1 – Forensic Toxicology • Toxicology Vocabulary • Pick Your Poison Poster Project • Discussion Post 9.1
Module 10 Starts _____	Forensic Odontology	<ul style="list-style-type: none"> • Lesson 10.1 – Forensic Odontology • Ted Bundy Case Study • Bite Mark Comparison and Analysis • Discussion Post 10.1
Module 11 Starts _____	Forensic Anthropology	<ul style="list-style-type: none"> • Lesson 11.1 – Forensic Anthropology • Written in Bone Mini-Research Project • John Wayne Gacy Case Study • Facial Recognition and Bone Structure Activity • OPTIONAL: Forensic Anthropology Gallery Walk • Discussion Post 11.1

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 12 Starts _____	Forensic Psychology	<ul style="list-style-type: none"> • Lesson 12.1 – Forensic Psychology • Eyewitness Testimony and Memory Vocabulary • Ronald Cotton Case Study • Eyewitness Testimony and Memory Webquest • “What Kind of Eyewitness Would You Be?” Self-Check • Jack the Ripper Case Study • Criminal Psychology Project (Criminal Profiling) • Discussion Post 12.1
Module 13 Starts _____	Firearms and Ballistics	<ul style="list-style-type: none"> • Lesson 13.1 – Firearms and Ballistics • Mark Comparison and Analysis • ACTIVITY/INVESTIGATION TBD • Discussion Post 13.1
Module 14 Starts _____	Arson	<ul style="list-style-type: none"> • Lesson 14.1 – Arson Investigation • Forensic Science of Arson – Arson Investigation and Activity • Arson PBL (if in person) • Discussion Post 14.1
Module 15 Starts _____	Final Forensics CSI Project	<ul style="list-style-type: none"> • Student-Led Mock Crime Scene with Physical Models • Group Crime Scene Reconstruction • Project Presentations