



**SCI 285/ CJS 285: HYBRID + ACCELERATED**  
**Forensic Science with Laboratory: 4 credits (CRN: 3399)**  
**Middlesex Community College**  
**Course Syllabus**



**TIME:** Fall 2018      HYBRID: Friday and Saturday Lab Course  
CRN 3399      Friday: Lab                      5:30 pm – 8:30 pm – Wheaton Hall 221  
Saturday: Lab                      8:30 am – 12:00 pm – Wheaton Hall 221

**PLACE:** Room 221 Wheaton Hall (Lab)

**INSTRUCTOR:** Professor Rebecca Rist-Brown  
Email: [ristbrown@mxcc.edu](mailto:ristbrown@mxcc.edu)  
Phone: 860-343-5849  
Office Location: Snow 508  
Office Hours: Monday - Thursday 9:30 AM – 11:00 AM

**E-Mail:** Please contact me through Blackboard messaging.  
If Blackboard is down email: [ristbrown@mxcc.edu](mailto:ristbrown@mxcc.edu)

**COURSE PREREQUISITES:** CJS\*101 with a grade of “C-” or better, AND ENG\*101-ALP, [ENG\\*101E](#), or [ENG\\*101](#) with a grade of “C-” or better.

**TEXT:** Pearson Custom Library: CJS 285/CJS 285 Forensic Science with Laboratory: Saferstein. – Available at the MxCC Bookstore.

Please note that students may also use:  
Saferstein, R. (2010) *Criminalistics: An Introduction to Forensic Science* 10<sup>th</sup> Edition. Pearson. ISBN-13: 9780135045206 – please note that the chapter ordering and numbers will be different. Do not attempt to use the 11<sup>th</sup> edition.

## **I. COURSE OBJECTIVES:**

A study of how the disciplines of Biology, Chemistry, Earth Science, Physical Science, and Physics meld to form the field of Forensic Science. The course will focus on developing the scientific vocabulary necessary for investigators to communicate with scientists. This course is meant to assist students who are pursuing a career in criminal justice. Emphasis of the course is placed on scientific analysis of data rather than detective work. Students will learn to appreciate how the major fields of science are utilized in solving crimes. The laboratory component will provide hands-on opportunities to integrate scientific methodology as it relates to criminal justice and the limitations of scientific testing.

## **II. SPECIFIC LEARNING OUTCOMES:**

### **Lecture:**

- Develop a working scientific vocabulary for investigators to effectively communicate with scientists.
- Understand the integration of scientific methodology as it relates to criminal justice and the limitations of scientific testing
- Become familiar with equipment and techniques utilized in organic and inorganic analysis.
- Be knowledgeable of information that can be obtained through biological testing.
- Understand the principles of physics and how they are used in crime scene reconstruction.

### **Laboratory:**

- Appreciate the importance of the scientific method and proper data collection.
- Understand what happens to physical evidence when it is sent to the laboratory and recognize the importance of proper collection techniques.

- Become familiar with basic laboratory practices and understand how to effectively communicate with forensic scientists and laboratory personnel.
- Recognize the factors that can contribute to unintentional destruction or contamination of evidence, which can impede further laboratory testing.
- Appreciate the limitation of scientific testing within the laboratory.

### III. COURSE REQUIREMENTS- OVERVIEW:

1. Course materials will be delivered via Blackboard and will enable student to complete their academic work in a flexible manner, completely online. The course is broken down into five weeks: Week #1: Chapters #1-#4, Week #2: Chapters #5-#8, Week #3: Chapter #9-#12. Week #4: Chapters #13-#16, and Week #5: the Laboratory Practical.
2. The “lectures” for this course consists of PowerPoint presentations with an audio component. PowerPoint presentations will be posted on Blackboard for students to access in the corresponding weekly folder. It is **strongly recommended** that students read the PowerPoints and textbook as well as listen to the audio lectures. Students should print the chapter PowerPoints prior to listening to the audio lectures and take notes as they listen to each “lecture.”
3. You must contact the instructor **in advance** if you have a good reason to miss a lab, assignment, or exam. **Only students with a prearranged absence will be permitted to make up assignments or exams.** Labs cannot be made up.
4. Reading assignments must be completed prior to taking exams.
5. Assignments must be turned in on time. **Late work will not be accepted.** Instructor reserves the right to modify this rule only in exceptional cases. All labs are due at the end of the lab session
6. Your grade is the calculation of points earned and total possible points based on the results of:

Four Exams	(125 points each)	500 Total
Lab Reports – Points Vary	(points vary – in brackets on Lab Schedule)	300 Total
Lab Practical	(150 points)	150 Points
Syllabus Quiz	(25 points)	025 Points
Introduction Post	(10 points)	010 Points bonus
Professionalism	(25 points)	<u>025 Points</u>

Total: 1000 Points

### IV. IMPORTANT DATES: SUBJECT TO CHANGE

08/28	Wednesday	Introduction Post and Syllabus Quiz Due
09/02	Sunday	Exam #1: Chapters #1 - #4
09/09	Sunday	Exam #2: Chapters #5 - #8
09/16	Sunday	Exam #3: Chapters #9-#12
09/30	Sunday	Exam #4: Chapters #13-#16
09/30	Sunday	Lab Practical Assignment

### V. COURSE REQUIREMENTS- LABORATORY:

1. Attendance is taken every lab period. Be on time and only leave lab after checking with me. Instructor reserves the right to deny admittance for a student who is late and misses lab instructions.
2. Students must come to class prepared to perform the laboratory exercises assigned for that day. Students **MUST** read the laboratory instructions prior to starting the lab. Laboratory instructions are posted on the Blackboard shell.
3. Labs will be reviewed prior to the start of lab.
4. All data will be collected during the lab period. While students will work in groups, it is expected that each student will participate in every aspect of the lab procedure and will complete their own lab assignment. All data will be collected and

recorded into lab books during the laboratory periods. Students may not use data from other laboratory groups or students.  
**All labs are due at the end of class.**

5. It is expected that all students will follow all safety guidelines. Failure to follow these guidelines will result in the student being asked to leave lab for that period. If a student is asked to leave lab, the student will receive a zero for the lab.

6. **MISSED LABS CANNOT BE MADE-UP .**

7. Lab practical: The lab practical will be held during the 4<sup>th</sup> week of lab. You will be work in collaborative groups to process a mock crime scene and determine laboratory process.

## **VI: EXAMS:**

Exams will be online with a 2.0 hour time limit.

They are a combination of multiple choice, true and false, fill in the blank, matching, and short answer. Exams are not generally cumulative, but may be semi-cumulative if necessary. Exam material comes from textbook reading, lecture material, chapter PowerPoints, or any other material posted in the Blackboard Shell.

- Exams must be completed before the deadline of 11:59 pm on the due dates. Late submissions will not be accepted.
- Please make certain to read all the chapters and complete all assignments prior to starting the exam.
- Please note that it is the student responsibility to make certain that they have a continuous internet connection for the duration of the exam. Exams will not be reset if they lose internet access during the exam. Once an exam is submitted or closed, it will not be reopened.
- **Cheating of any kind will not be tolerated and will result in a grade of “F” for the course and immediate referral to the Academic Dean for further disciplinary action.**

## **VII: SYLLABUS QUIZ AND STUDENT PROFESSIONALISM:**

**Syllabus Quiz:** During the first week of class students will take a brief quiz on the syllabus and introductory material. Questions on the quiz will pertain to policies, procedures, and the general format of the course. The quiz is meant as a vehicle to test students’ understanding of the expectations for the course.

**Student Professionalism:** Students will be graded on their professionalism during this course. The professionalism grade is meant to reward students who are meeting or exceeding Middlesex Community College’s expectations for student behavior.

### **Do’s:**

- Be on time and prepared for each class.
- Be courteous and respectful to your classmates.
- Help other students who may need assistance.
- Keep electronics use to a minimum (check only if emergency situation)
- Actively participate during class discussions.

### **Don’ts:**

- Be disrespectful to the instructor, guests, or other students.
- Be involved in academic dishonesty
- Arrive late to class.
- Text and use electronic devices during class.
- Be untruthful
- Record class without permission.

## **VIII: CRIMINAL JUSTICE/SCIENCE GRADING SCALE:**

<u>Letter Grade:</u>	<u>Percentage:</u>	<u>Letter Grade:</u>	<u>Percentage:</u>
A	93-100	C	73-76
A-	90-92	C-	70-72

<b>B+</b>	<b>87-89</b>	<b>D+</b>	<b>67-69</b>
<b>B</b>	<b>83-86</b>	<b>D</b>	<b>63-66</b>
<b>B-</b>	<b>80-82</b>	<b>D-</b>	<b>60-62</b>
<b>C+</b>	<b>77-79</b>	<b>F</b>	<b>Below 60</b>

## **IX: WITHDRAWAL:**

Withdrawal: Student may withdraw from the class with a grade of “W” before the 75% completion date of the course. After that date, students will receive a “W” or an “F.” Students may withdrawal from the course only after speaking with the instructor and filing all the proper paperwork. Note: The primary responsibility for initiating a withdrawal rests with the students. Withdrawal from the course is official only when initiated in writing through the Records office, all requested signatures are obtained, and the proper papers are filed with the Records Office by the indicated deadlines.

**THE FINAL DAY THAT I WILL SIGN A WITHDRAWAL WILL BE SEPTEMBER 21<sup>st</sup>. No withdrawals will be signed after that point.**

## **X: CLASS CANCELLATION AND OTHER MxCC POLICIES:**

In the event of inclement weather either before the start of the day when classes are in session or during the school day, you may check for information on delayed openings, college closings, class cancellations, etc, but listing to the local radio stations and television stations. Additionally, a message will be posted on the MxCC website at [www.mxcc.comnet.edu](http://www.mxcc.comnet.edu) and an announcement is made on the college’s main phone number (860) 343–5800. When calling the main phone number, be sure to choose option #1 from the menu for school closings. If classes are already in session, everyone on campus will be notified of any changes. Decisions to cancel classes or close the college early will be made as soon as practicable.

**Additional Syllabus Information:** For information about the college's policies and procedures regarding academic honesty, accessibility/disability services, attendance, audio-recording in the classroom, grade appeals, plagiarism, religious accommodations, weather/emergency closings, and more, please go to the following website: [www.mxcc.edu/catalog/syllabus-policies/](http://www.mxcc.edu/catalog/syllabus-policies/)

## **XI: ANTI-PLAGIARISM DETECTION SOFTWARE**

SafeAssign, TurnItIn or other anti-plagiarism detection software products may be used in this course. Anti-plagiarism detection software products assist faculty and students in preventing and detecting plagiarism. Professors may utilize such software in order to check the originality of the academic work students submit in a course by comparing submitted papers to those contained in its database consisting of submitted papers and other sources. Anti-plagiarism detection software returns an “originality report” for each submission. The report is limited in scope to merely identifying passages that are not original to the author of the submitted work and which may include correctly cited quotations and information. Professors and students must carefully review such reports. No adverse action may be taken by a professor with respect to a student solely on the basis of an originality report which indicates the potential for plagiarism.

In this course you may be asked to submit your academic papers and other creative work containing personally identifiable information for originality reporting. By doing so, your work along with personally identifiable information will be retained in the product database and may be subsequently reported out containing your personally identifiable information not only to your professor, but also to professors of other universities and colleges within Connecticut State Colleges and Universities (CSCU) as part of subsequent originality reports.

You may decline to submit your work for originality reporting. If so, you must be provided an alternative method in which to submit your work. However, your professor, after removing your personally identifying information, may nonetheless submit limited portions of your academic work for originality reporting.

All Article Summaries will be submitted via a Safe Assign Assignment in the Blackboard Course Shell. Please note that assignments that are not submitted via Blackboard will not be accepted.

## **XII: IMPORTANT COLLEGE POLICIES!! PLEASE READ CAREFULLY!**

For information about the college's policies and procedures regarding academic honesty, accessibility/disability services, attendance, audio-recording in the classroom, grade appeals, plagiarism, religious accommodations, weather and emergency closings, and more, please go to the following website: [www.mxcc.edu/catalog/syllabus-policies/](http://www.mxcc.edu/catalog/syllabus-policies/) or scan the QR code with your smart phone. Also, please become familiar with the policies regarding nondiscrimination, sexual misconduct, and general student conduct at the following website: [www.mxcc.edu/nondiscrimination/](http://www.mxcc.edu/nondiscrimination/).



#### **NON-DISCRIMINATION STATEMENT**

Middlesex Community College does not discriminate on the basis of race, color, religious creed, age, sex, national origin, marital status, ancestry, present or past history of mental disorder, learning disability or physical disability, sexual orientation, gender identity and expression or genetic information in its programs and activities. In addition, the College does not discriminate in employment on the additional basis of veteran status or criminal record.

The following people have been designated to handle inquiries or complaints regarding non-discrimination policies and practices:

- Primary Title IX Coordinator  
Dr. Adrienne Maslin  
Dean of Students/Title IX and Section 504/ADA Coordinator  
amaslin@mxcc.edu; 860-343-5759; Founders Hall Room 123
- Primary Title IX Coordinator  
Anastasia Pych  
Director of Human Resources and Labor Relations  
apych@mxcc.edu; 860-343-5751; Founders Hall Room 116

**Disclaimer:** The instructor reserves the right to amend any portion of this syllabus to meet the educational needs of the students in the course.

**SCI 285: Forensic Science with Laboratory  
HYBRID ACCELERATED**

**Fall 2018**

**Laboratory Schedule:**

<u>Week:</u>	<u>Dates</u>	<u>Times</u>	<u>Laboratory Topic:</u>
Week #1	Friday 08/31	5:30 PM – 8:30 PM	<ul style="list-style-type: none"> <li>▪ Introduction to lab and safety Procedures</li> <li>▪ Bertillion Measurement Lab (15)</li> <li>▪ Crime Scene Sketch (15)</li> </ul>
	Saturday 09/01	8:30 AM – 12:00 PM	<ul style="list-style-type: none"> <li>▪ Locard's Principle of Exchange (10)</li> <li>▪ Glass Analysis Principles (10)</li> <li>▪ Soil Analysis (10)</li> </ul>
Week #2	Friday 09/07	5:30 PM – 8:30 PM	<ul style="list-style-type: none"> <li>▪ GSR and Explosive Testing (15)</li> <li>▪ GSR Presumptive Test (15)</li> </ul>
	Saturday 09/08	8:30 AM – 12:00 PM	<ul style="list-style-type: none"> <li>▪ Document Analysis Lab (30)</li> </ul>
Week #3	Friday 09/14	5:30 PM – 8:30 PM	<ul style="list-style-type: none"> <li>▪ ID Unknown Substance I Drug Lab (15)</li> <li>▪ Analysis of Over the Counter Drugs (15)</li> <li>▪ ID Unknown Substance II Drug Lab (15)</li> </ul>
	Saturday 09/15	8:30 AM – 12:00 PM	<ul style="list-style-type: none"> <li>▪ Microscopy 101 (15)</li> <li>▪ Microscopy with Hairs, Fibers, and Paints. (20)</li> <li>▪ Forensic Fiber Analysis (10)</li> </ul>
Week #4	Friday 09/21	5:30 PM – 8:30 PM	<ul style="list-style-type: none"> <li>▪ Coroners Urine Blood Lab (15)</li> <li>▪ BAC Testing Lab (15)</li> </ul>
	Saturday 09/22	8:30 AM – 12:00 PM	<ul style="list-style-type: none"> <li>▪ Lab Practical (Mock Crime Scene)</li> </ul>
Week #5	Friday 09/28	5:30 PM – 8:30 PM	<ul style="list-style-type: none"> <li>▪ DNA Strawberry Lab (5)</li> <li>▪ Dyeing for Forensics (10)</li> <li>▪ Who is the Daddy (10)</li> </ul>
	Saturday 09/29	8:30 AM – 12:00 PM	<ul style="list-style-type: none"> <li>▪ Bloodstain Pattern Analysis (15)</li> <li>▪ ABO Typing Lab (10)</li> <li>▪ Kastle Meyer Presumptive Test (10)</li> <li>▪ Forensic Glow Demo</li> <li>▪ Presumptive Blood Test Demo</li> </ul>

**IMPORTANT:**

Labs are due at the end of lab with the exception of the lab practical assignment.

**\*Lecture and Laboratory Schedule may be subject to change due to extenuating circumstance or to meet the educational needs of the students in the course.**

# SCI 285: Hybrid + Accelerated: Fall 2018

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
<b>August</b>							
<b>Week #1</b>	26	27	28	29	30	31	1
	Syllabus			Introduction Post Due		<b>Lab:</b>	<b>Lab:</b>
	Intro PPT	Chapter #2	Chapter #3		Chapter #4	Lab Safety	Locard's Lab
	Chapter #1			Syllabus Quiz Due		Bertellion	Glass Analysis
						Crime Scene	Soil Analysis
<b>September</b>							
<b>Week #2</b>	2	3	4	5	6	7	8
	Exam #1 Due Chapters 1-4					<b>Lab:</b>	<b>Lab:</b>
		Chapter #5	Chapter #6	Chapter #7	Chapter #8	GSR Testing	Documents
						GSR Presumptive	
<b>Week #3</b>	9	10	11	12	13	14	15
	Exam #2 Due Chapters 5-8					<b>Lab:</b>	<b>Lab:</b>
		Chapter #9	Chapter #10	Chapter #11	Chapter #12	ID Unknown I	Microscopy 101
						ID Unknown II	Hair Fiber Paint
					Analysis Drugs	Fiber Analysis	
<b>Week #4</b>	16	17	18	19	20	21	22
	Exam #3 Due Chapters 9-12					<b>Lab:</b>	<b>Lab:</b>
		Chapter #13	Chapter #14	Chapter #15	Chapter #16	Coroners Lab	Lab Practical
						BAC Testing	
<b>Week #5</b>	23	24	25	26	27	28	29
						<b>Lab:</b>	<b>Lab:</b>
		Practical Project	Practical Project	Practical Project	Practical Project	DNA Strawberry	Bloodstain
						Dyeing Forensic	ABO Tying
					Who's Daddy	Kastle Meyer	
<b>Week #5</b>	30						
	Lab Practical Due						
	Exam #4 Due Chapters 13-16						

## Topics Covered in Forensic Science with Laboratory:

Below is a list of topics that will provide a guide for students during the semester. The students should become familiar with each of these topics. Each topic includes important concepts and vocabulary with which the students will develop competencies. Lectures will be used to present and elaborate on these topics. Readings from the text will provide the students with an introduction to these topics and a means for the student to continue their learning and as a review of the material presented in lecture.

Unit #	Instructional Unit	Specific Objectives of Unit
1	Introduction	<ul style="list-style-type: none"> <li>• Define and distinguish forensic science and criminalistics</li> <li>• Identify the major contributors to the development of forensic science.</li> <li>• Identify the major events that have led to the rapid growth of forensic laboratories in the past forty years.</li> <li>• List and define the services of a typical comprehensive crime laboratory in the criminal justice system.</li> <li>• Compare and contrast the Frye and Daubert decisions relating to the admissibility of scientific evidence in the courtroom and the role of the expert witness.</li> <li>• Interconvert among units of the SI (metric) system</li> </ul>
2	Crime Scene	<ul style="list-style-type: none"> <li>• Define physical evidence.</li> <li>• Describe proper procedures for conducting a systematic search of a crime scene for physical evidence and the steps to thoroughly record the crime scene.</li> <li>• Describe proper techniques to minimize contamination and degradation of evidence</li> <li>• Explain Locard's principal of exchange and how it relates to evidence in criminal investigations.</li> <li>• Explain how Locard's principal affects evidence collection and scientific results</li> </ul>
3	Physical Evidence	<ul style="list-style-type: none"> <li>• Explain the difference between identification and individualization of physical evidence.</li> <li>• List and explain the function of national databases available to forensic scientist.</li> <li>• Explain the contributions and limitations that a forensic pathologist, forensic anthropologist, and forensic entomologist, can make to a death investigation.</li> <li>• Devise a systematic approach to collecting and analyzing trace evidence</li> <li>• Define chain of custody and its importance in the legal system</li> </ul>
4	Physical Properties: Glass and Soil	<ul style="list-style-type: none"> <li>• Define and distinguish between the physical and chemical properties of matter.</li> <li>• Perform a variety of conversions including the metric system.</li> <li>• Define and describe the properties of density and refractive index.</li> <li>• Explain the dispersion of light through a prism.</li> <li>• List and explain forensic methods for comparing glass fragments.</li> <li>• Analyze glass fractures to determine the direction of impact for a projectile.</li> <li>• List the important forensic properties of soil.</li> <li>• List methods and techniques involved in soil analysis</li> </ul>
5	Organic Analysis	<ul style="list-style-type: none"> <li>• Define and distinguish elements and compounds.</li> <li>• Differentiate properties of a solid, liquid, and gas.</li> <li>• Define and distinguish between organic and inorganic compound.</li> <li>• Differentiate between qualitative and quantitative analysis.</li> <li>• Describe and explain the process of chromatography.</li> <li>• List and describe the parts of a gas chromatograph.</li> <li>• Explain the difference among thin-layer chromatography, gas chromatography, and electrophoresis.</li> <li>• Differentiate between the wave and particle theories of light.</li> <li>• Describe the electromagnetic spectrum.</li> <li>• State the components of a simple absorption spectrophotometer.</li> <li>• List the practical applications of ultraviolet and infrared spectroscopy for the identification of organic compound.</li> <li>• Identify the utility and application of mass spectrometry for identification analysis.</li> </ul>
6	Inorganic Analysis	<ul style="list-style-type: none"> <li>• Identify trace elements useful for forensic comparison of various types of physical evidence.</li> <li>• Differentiate between continuous and line emission spectra.</li> <li>• Identify the parts of a simple emission spectrograph and a simple atomic absorption spectrophotometer.</li> <li>• Define and distinguish between protons, neutrons, and electrons.</li> <li>• Define and distinguish between atomic number and atomic mass.</li> <li>• Explain how an atom absorbs and releases energy in the form of light.</li> <li>• Explain the concept of an isotope.</li> <li>• Define radioactivity and explain how elements can be made radioactive.</li> <li>• Explain why x-ray diffraction patterns are useful for chemical identification.</li> </ul>



7	Document Analysis/ TLC	<ul style="list-style-type: none"> <li>List some of the techniques document examiners use to uncover alterations, erasures, obliterations, and variation in pen inks.</li> <li>Utilize chromatography to separate and identify different inks</li> </ul>
8	Drugs	<ul style="list-style-type: none"> <li>List commonly abused drugs and describes the laboratory tests normally used to perform a routine drug identification analysis.</li> <li>Differentiate between a presumptive color test and a confirmatory test.</li> </ul>
9	Fire Investigation	<ul style="list-style-type: none"> <li>List the conditions necessary to initiate and sustain combustion.</li> <li>Describe the three mechanism of heat transfer.</li> <li>Identify conditions of an accelerant-initiated fire.</li> <li>List laboratory procedures used to detect and identify hydrocarbon residues.</li> </ul>
10	Explosion	<ul style="list-style-type: none"> <li>Classify explosive and list common commercial, homemade, and military explosives.</li> <li>List laboratory procedures used to detect and identify explosive residues.</li> </ul>
11	Microscope	<ul style="list-style-type: none"> <li>List the parts of the compound microscope explain the role of each.</li> <li>Define magnification, field of view, working distance, and depth of focus.</li> <li>Differentiate between the comparison and compound microscope.</li> <li>Explain the theory and utility of the stereo microscope and how a microscpectrophotometer is designed to characterize polarized light.</li> <li>Explain how a microscpectrophotometer can be used to examine trace evidence.</li> <li>Differentiate between the image formation mechanisms of a light microscope to that of a scanning electron microscope.</li> <li>List the forensic applications of the scanning electron microscope.</li> </ul>
12	Hair, Fiber, and Paint	<ul style="list-style-type: none"> <li>Identify and explain the role of the cuticle, cortex, and medulla area of hair.</li> <li>List the three phases of hair growth.</li> <li>Differentiate between animal and human hairs.</li> <li>List the features that are useful for the microscopic comparison of human hair.</li> <li>Explain the role of DNA typing in hair comparisons.</li> <li>Differentiate between natural and manufactured fibers.</li> <li>List the properties of fibers that are most useful for forensic comparison.</li> <li>List the types of examinations performed when comparing paint samples</li> </ul>
13	Forensic Toxicology	<ul style="list-style-type: none"> <li>Explain how alcohol is absorbed into the blood stream, transported throughout the body, and eliminated by oxidation and excretion.</li> <li>Explain the process by which alcohol is excreted in the breath via the lungs.</li> <li>Describe commonly employed field sobriety test to assess alcohol impairment.</li> <li>Differentiate between infrared and fuel cell breath testing devices for alcohol testing.</li> <li>List the different laboratory procedures utilized for measuring the concentration of alcohol in the blood.</li> <li>List the precautions that need to be taken to properly preserve blood in order to analyze its alcohol content.</li> <li>List the techniques that forensic toxicologist use to isolate and identify drugs and poisons.</li> <li>Explain the significance of finding a drug in human tissue and organs to assess impairment.</li> <li>Explain the drug recognition program and how it coordinates with forensic toxicology results.</li> </ul>
14	Forensic Serology	<ul style="list-style-type: none"> <li>List the ABO antigens and antibodies found in the blood for each of the four blood types: A, B, AB, and O</li> <li>Explain how whole blood is typed.</li> <li>List and describe forensic tests used to characterize a stain as blood.</li> <li>Explain the concept of antigen-antibody interactions and how it is applied to species identification and drug identification.</li> <li>Differentiate between monoclonal and polyclonal antibodies.</li> <li>Differentiate between a chromosome and gene.</li> <li>Utilize a Punnett square to determine the genotype and phenotype of an offspring.</li> <li>List the laboratory tests necessary to characterize seminal stains.</li> </ul>
15	DNA	<ul style="list-style-type: none"> <li>Name the parts of the nucleotide and explain how they are linked together to form DNA.</li> <li>Explain the concept of base pairing as it related to the double-helix structure of DNA.</li> <li>Differentiate between DNA strands that code for the production of proteins with strands that contain repeating base sequences.</li> <li>Explain the technology of polymerase chain reaction (PCR) and how it applies to forensic DNA typing.</li> <li>Explain the structure of a STR.</li> <li>Differentiate between nuclear and mitochondrial DNA.</li> <li>Explain how DNA computerized databases are utilized in criminal investigations.</li> <li>List the necessary procedures for the proper preservation of bloodstained evidence for laboratory DNA analysis</li> <li>Set up and run electrophoresis with a DNA sample to compare known to unknown sample</li> </ul>

16	Blood Spatter	<ul style="list-style-type: none"><li>• Explain how science is utilized during the reconstruction of a crime scene.</li><li>• Explain how surface texture, directionality, angle of impact, and pattern analysis can be used for reconstruction.</li><li>• Calculate the angle of impact of a bloodstain using its dimensions.</li><li>• Identify low, medium, and high velocity blood spatter and how they are used.</li><li>• List the methods for determining the area of convergence and the area of origin for impact spatter.</li></ul>
----	---------------	---