

**SUL ROSS STATE UNIVESRITY-RIO GRANDE COLLEGE
DEL RIO * EAGLE PASS * UVALDE
DEPARTMENT OF NATURAL & BEHAVIORAL SCIENCES
CRIMINAL JUSTICE PROGAM
COURSE SYLLABUS**

COURSE TITLE: CRIM 3303 Introduction to Forensic Science

COURSE PERIOD: Online Web Course

INSTRUCTOR: Dr. Ferris Roger Byxbe fbyxbe@sulross.edu

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COURSE DESCRIPTION: An introduction to forensic science, the purpose and intent of this course is to familiarize the criminal justice student with recognition, examination, identification and interpretation of evidence and the modern crime laboratory. The nature of forensic evidence is emphasized along with the limitations that technology and knowledge impose on its individualization and class characterization.

TEXTBOOK: Introduction to Forensic Science & Criminalistics
R.E. Gaensslen, Howard A. Harris, Henry Lee
McGraw Hill
ISBN: 978-0-07-298848-2

ACADEMIC SUCCESS: Students enrolling in online web courses at Rio Grande College must be aware that such courses are not self-paced and require considerable vested time in order to meet requirements. Students should be prepared to devote a considerable amount of time to accomplish the requisites in this course. Each semester will require a student to devote approximately 12 hours per week to each web class – which equates to 3 hours of class time plus 9 hours of reading, research, writing and other course preparation.

COMPUTER LABS: Rio Grande College computer labs are open Monday – Thursday 8:00AM - 9:00PM and Friday 8:00AM – 5:00PM. **RGC Computer labs are not open weekends.** However, students may avail themselves to the SWTJC computer labs with a valid ID.

Online web students should have available a high-speed internet connection on a regular basis for off-campus course work, exams, assignments and research.

DISHONESTY:

Academic cheating and plagiarism is not acceptable behavior. It violates university policy and human ethics. If a violation occurs the penalty will result in the grade of “F” for the semester.

EXAMINATIONS:

Exams have been structured to mandate maximum participation in this course of study.

- There will be an exam each week.
- Chapter reading assignments are of the utmost importance for student learning outcomes and assessment.
- Exams will consist of multi-formatted questions taken from weekly reading assignments.
- It is recommended that all exams be taken in the computer laboratory on the Rio Grande College campus. However, this is not required. Exams may be taken at any location using a high-speed internet connection. Firefox browser is recommended for accessing all Blackboard exams.
- **Weekly exams will be made available for 24 hours each Thursday. 12:00 AM – 11:59 PM.**
- Students may access the exam one-time only. Students are allotted 75 minutes for each exam. Students who exceed the allotted testing period will be timed-out.

NO MAKE-UP EXAMS:

If a student **for any reason:**

- fails to take an exam
 - fails to complete an exam
 - fails to submit an exam
- will result in a failed exam.

The professor assumes no responsibility for student omissions or technology issues. No exams will be reset for any reason. There will be no make-up exams for any reason.

GRADING SCALE:

450 - 500 = A
400 - 449 = B
350 - 399 = C
300 - 349 = D
0 - 299 = F

NOTE: Each exam is worth 100 points x 5 exams = 500 total points.

SEMESTER GRADES:

Final semester grades are reported to the Office of Admissions & Records at the conclusion of each semester and grades are

posted on Banner for student review.

COURSE OBJECTIVES: Upon reading assigned chapters in the textbook with a thorough analysis of the key concepts, terms, scientific principles and investigative procedures within each chapter the student will acquire extensive knowledge of the following subject-matter materials to be inclusive on each examination.

Chapter 1: Introduction to Forensic Science

1. The nature and role of forensic science.
2. The value of forensic science to the society.
3. The historical development of forensic science.
4. The development of forensic science and laboratories in the United States.
5. The operations of forensic science laboratories.
6. The importance of anthropometry and fingerprint identification to the development of the forensic sciences.
7. The nature of the scientific method and how it might operate in everyday situations.
8. The key role that the scientific method plays in all aspects of forensic science and investigations.
9. The main specialty areas of forensic science and the scope of each of them.
10. The elements of forensic analysis and the types of results forensic science can provide.
11. The concepts of recognition, classification (identification), individualization, and reconstruction.
12. Comparisons as a basis of forensic science analysis

Chapter 2: Physical Evidence and the Legal System

1. How physical evidence is created during an incident.
2. The nature of impressions, imprints, indentations, and striations.
3. The Locard Exchange Principle and its centrality to forensic science.
4. How physical evidence might be classified in ways that are useful to investigators.
5. The major uses for physical evidence in cases.
6. The steps required for the effective discovery and use of physical evidence.
7. Basic practices of physical evidence labeling, packaging, and preservation.
8. Different types of laboratory analysis and their applicability to different types of evidence.
9. The importance of reporting and testimony to the forensic scientist's function.
10. How the need for social organization developed into the rule of law.
11. The complex pathways of the flow of evidence in the criminal justice system as an incident goes from initial report to final resolution.
12. Admissibility of evidence versus its weight in a legal context.
13. Rules for the admissibility of scientific and technical evidence—the *Frye* and *Daubert* cases and criteria.

Chapter 3: Crime Scene Processing and Analysis

1. How crime scene processing is different from crime scene analysis.
2. The different types of crime scenes.
3. Initial actions at a crime scene.
4. Establishing crime scene security and reasons for maintaining security.
5. The steps in crime scene processing.
6. The process of evidence recognition based on hypothesis formulation.
7. The schemes for searching crime scenes.
8. The importance of and major methods for crime scene documentation.
9. Making notes.
10. Making sketches and types of sketches.
11. Technical and forensic guidelines for photography.
12. Videotaping crime scenes.
13. About the duty to preserve crime scene work product.
14. Different methods of collecting physical evidence and applicability to different categories of evidence.
15. Numbering and description of physical evidence from the scene.
16. Various types of packaging for different types of evidence.
17. Types of controls and standards for each type of physical evidence.
18. Submission of physical evidence for laboratory analysis.
19. Crime scene analysis and crime scene reconstruction.
20. The difference between reconstruction and reenactment.

Chapter 4: Examination and Interpretation of Patterns for Reconstruction

1. The difference between reconstruction and individualization patterns.
2. Evidence patterns that can be collected, primarily for individualization, are called individualization patterns.
3. There are 10 major patterns for reconstruction: blood spatter, glass fractures, track and trail, tire and skid marks, clothing and article or object, gunshot residue, projectile trajectory, fire burn, MO and profiling, and wound, injury, & damage.
4. Some reconstruction patterns must be compared with experimentally produced patterns from interpretation.
5. Reconstruction patterns must be documented.
6. Reconstruction patterns usually cannot be “collected” as such.
7. Blood droplets moving through air behave predictably according to physical laws.
8. Reconstruction from blood patterns is partially based on knowing the number of blood sources at a scene.
9. The side of broken glass from which force was applied to cause the breakage can be determined.
10. The order of gunshots or other impact points can sometimes be determined in glass that is broken but still essentially in one piece.
11. Foot, footwear, tire, or blood trail patterns can help reconstruct the number of persons at a scene and their movements.
12. Tire and skid mark patterns are used by traffic accident reconstruction experts to estimate position and speed of vehicle.

13. Clothing, article, or object patterns are based on looking for unusual or unexpected arrangements or disorder in a scene.
14. Tears, cuts, or damage to clothing or other objects can provide information for reconstruction.
15. Gunshot residue patterns on target surfaces can be used to estimate muzzle to target distances.
16. Trajectory analysis (ballistics) can help to establish the positions and orientations of shooters and victims in shooting cases.
17. Ballistics should not be confused or equated with firearms identification.
18. Burn patterns at suspicious fire scenes can help establish origin and cause of fires.
19. Burn patterns are used by fire investigators along with analysis of the overall scene and investigation of mechanical and electrical equipment to help determine origin and cause.
20. MO refers to repeat offender's habits and can be used to help connect related cases.

Chapter 5: Examination of Physical Pattern Evidence

1. The three types of forensic analysis of physical patterns.
2. Direct physical matching versus indirect physical matching.
3. Impression marks can be imprints (effectively two-dimensional) or indentations (three dimensional).
4. Striations are caused by a moving object making a dynamic impression.
5. Striation marks are characteristic of firearms, toolmark and some other evidence.
6. Using class and individual characteristic of patterns to compare for common origin is a multiple step process.
7. Comparisons between questioned and known patterns can lead to identification, exclusion, or they may be inconclusive.
8. Requirements for knowns (exemplars) differ according to the type of pattern.
9. The comparison process is similar with different pattern types.
10. The process involves pattern recognition, comparison, identification of class characteristics, then use of individual characteristics to try to achieve positive individualization.
11. The methods of pattern evidence comparison have come into question by a few courts as not sufficiently scientifically-based to meet the Daubert criteria for admissibility of scientific evidence into court.
12. Footwear and tire impressions are the most common individualization patterns, leaving aside fingerprints, firearms, and document evidence (such as handwriting).
13. Shape and form patterns (such as handwriting and human hair shaft morphology) are compared in a manner similar to the way the human mind recognizes people and objects.
14. Several other individualization patterns include bite marks, certain skeletal features, and voice patterns.

Chapter 6: Fingerprints and Other Personal Identification Patterns

1. Fingerprints are an old and very valuable type of physical evidence.

2. What friction ridge skin is and how it makes up fingerprints.
3. Fingerprints for personal identification dates back to medieval times, but in the West, dates back to the 19th century in British India and the United Kingdom.
4. Fingerprints can be classified and the most useful system is the 10-print classification system developed by Henry.
5. Large files of 10-print cards cannot be searched for individual prints.
6. AFISs contain individual print images and can be searched for individual prints efficiently and quickly.
7. There are established procedures for collecting and preserving latent fingerprints and items from scenes suspected of having latents.
8. The three types of evidentiary fingerprints: visible, patent, and latent.
9. Methods for visualizing latent fingerprints.
10. Processing latent prints with maximum efficiency and results requires a systematic approach.
11. The approach commonly used in fingerprint comparisons and identification can be summarized “ACE-V” (Analysis, Comparison, Evaluation, and Verification).
12. Fingerprint identification specialists belong to a professional organization that has its own professional journal and offers certification.
13. Other patterns for personal identification include palm and sole prints, bite marks, certain skeletal features, lip and ear prints, and voice identification.
14. Methods for the identification of human remains.
15. The method used to identify human remains depends on the circumstances, the condition of the remains, and the number of possible identities.

(*) Chapter 7: Questioned Document Examination

1. The wide variety of evidence that can be examined by a questioned document examiner.
2. The evolution of an individual’s handwriting from childhood to adulthood.
3. The major steps in preparing a document.
4. Special problems involving in properly collecting and preserving document evidence.
5. The science and technology that underlies handwriting and handwriting comparison.
6. Class and individual characteristics as applicable to handwriting.
7. The importance, and proper methods, of collecting known writing samples.
8. Basic approaches to the comparison of known and evidentiary writings.
9. The important nonhandwriting examinations performed by document examiners.
10. The examination of documents produced on typewriters, computer printers, and copy machines.
11. The examinations used to reconstruct altered documents.
12. Some techniques for deciphering of charred documents.
13. Techniques used to look for and read indented writing on a document.
14. The problem of trying to determine when a document was written.

Chapter 8: Toolmarks and Firearms

1. Understand the nature of toolmarks.

2. The different types of toolmarks.
3. The importance of looking for trace evidence associated with toolmarks.
4. The proper ways to collect and preserve toolmarks.
5. The examination and comparison process.
6. General nature of firearms.
7. The function and importance of the cartridge in the operation of a firearm.
8. The importance of rifling to firearm performance and forensic examination.
9. The major important types of firearms.
10. Proper procedures for collecting and preserving firearms and firearm evidence.
11. Major steps in the examination of a firearm and firearms evidence.
12. Growing importance of firearms data banks to investigation and prosecution.
13. Potential utility of examination of even highly damaged firearms evidence.
14. Uses of firearms evidence in reconstructing shooting incidents.
15. How and why firearms serial numbers are defaced.
16. Major techniques for restoring defaced serial numbers.

Chapter 9: Blood and Physiological Fluid Evidence

1. How some terminology associated with forensic biological evidence analysis has changed because of DNA typing.
2. What blood is and some of its different constituents.
3. How to collect and package biological evidence to best preserve it, and what control and comparison specimens are necessary for biological evidence analysis.
4. The relationship of certain types of control and comparison specimens to possible evidence contamination, and how contamination may be avoided or controlled.
5. How forensic scientists do initial examinations of biological evidence.
6. How blood is identified - presumptive and confirmatory tests.
7. How different physiological fluids are identified.
8. How sexual assault cases are investigated, and the role of forensic scientists.
9. Different types of sexual assault cases, and how the role of the forensic science lab might differ depending on the type of case.
10. Drug-facilitated sexual assaults (“date-rape” drug cases), and how they are investigated.
11. The genetic basis for the individuality of blood and body fluids.
12. The classical (conventional) genetic systems used to type forensic specimens before DNA.

(*) Chapter 10: DNA Analysis and Typing

1. How basic genetics works, and how “genetic markers” work with biological evidence analysis and typing.
2. What DNA is, including its structure and functions.
3. The “classical” genetic markers—how forensic scientists partially individualized biological evidence before DNA typing.
4. How genetic marker typing helps individualize biological evidence—some concepts of population genetics.

5. Where DNA is found in the body—nuclear and mitochondrial DNA (mtDNA).
6. How DNA technologies developed: RFLP, dot-blot, and STRs.
7. What the polymerase chain reaction is and its importance in biological research and forensic DNA analysis.
8. Current DNA typing methods, how they work and how DNA typing individualizes biological specimens.
9. DNA databases and data banks—CODIS.
10. The forensic applications of DNA typing: criminal, civil, human identification, parentage testing.
11. Some of the newer DNA technologies: “Y” chromosome and single nucleotide polymorphisms (SNPs).
12. The strengths and limitations of DNA technology and how they relate to the media hype and the ultimate potential.

(*) Chapter 11: Arson and Explosives

1. The science underlying combustion (fire).
2. Commonly encountered fuels.
3. Importance of pyrolysis in the combustion of solid fuels.
4. Useful investigative information available from careful examination of a fire scene.
5. Primary reasons for individuals setting arson fires.
6. Proper examination and processing of materials collected in the investigation of suspicious fires.
7. The most commonly encountered ignitable liquids used as accelerants in arson fires.
8. Laboratory analysis process for evidence from suspicious fires.
9. The science underlying an explosion.
10. Commonly used explosive materials.
11. Necessary components of an explosive device.
12. Processing and sampling of an explosion scene.
13. Laboratory analysis of explosive devices and residues.
14. Different approaches to examination of exploded and unexploded devices.
15. How explosives are identified from the analysis of explosive residues.

Chapter 12: Drugs, Drug Analysis, and Forensic Toxicology

1. Why a substance is called a drug.
2. The nature of drug dependency and its two major forms.
3. The impact of drug abuse on society and how society reacts.
4. Each of the major classes of abused drugs, with examples.
5. The rationale behind the controlled substances laws.
6. Processing of suspected controlled substances samples through the crime lab.
7. The major analytical steps from initial physical description to unambiguous identification.
8. The important distinction between qualitative and quantitative analysis.
9. The analysis of body fluid and tissue samples for drugs and poisons (forensic toxicology).

10. The critical role of alcohol and drugs in impaired driving cases.

Chapter 13: Materials Evidence

1. Materials evidence is used primarily for indicating possible connections.
2. The nature of and difference between transfer and trace evidence.
3. The most common sources of materials evidence.
4. The major categories of materials evidence.
5. The process of examination of materials evidence.
6. The major techniques for collecting materials evidence.
7. Five more important types of materials evidence.
8. The range of fibers encountered as evidence.
9. The structure and growth of human and animal hair.
10. The proper collection of hair control standards.
11. The laboratory examination and comparison of fiber and hair evidence.
12. The nature of paint and the importance of architectural and automotive paint evidence.
13. The collection of proper paint control standards.
14. The laboratory analysis and comparison of forensic paint evidence.
15. The nature of glass and its manufacture.
16. The proper collection of glass evidence.
17. The laboratory analysis and comparison of forensic glass evidence.
18. The composition of soil.
19. The common forensic occurrences of soil evidence.
20. The proper collection of soil evidence.
21. The laboratory analysis and comparison of forensic soil evidence.

(*) Chapters not assigned summer session II.

PROGRAM LEARNING OUTCOMES (PLO): The graduating student will

- 1) Demonstrate proficiency in the application of legal concepts, theoretical applications, scientific principles, and historical trends in the criminal justice arena.
- 2) Demonstrate the application of organizational principles, cultural, social and behavioral knowledge, critical thinking skills and cognitive thought processes within the criminal justice arena.

SEMESTER CALENDAR, READING ASSIGNMENT AND EXAM DATES

WEEK ONE:

(July 7 - 13)

Chapter 1: Introduction to Forensic Science

Chapter 2: Physical Evidence and the Legal System

Exam #1: Thursday, July 14th

WEEK TWO:

(July 14 - 20) Chapter 3: Crime scene Processing and Analysis

Chapter 4: Examination & Interpretation of Patterns for Reconstruction

Exam #2: Thursday, July 21st

WEEK THREE:

(July 21 -27)

Chapter 5: Examination of Physical Pattern Evidence

Chapter 6: Fingerprints & Other Personal ID Patterns

Exam #3: Thursday, July 28th

WEEK FOUR:

July 28 – Aug. 3)

Chapter 8: Tool Marks and Firearms

Chapter 9: Blood & Physiological Fluid Evidence

Exam #4: Thursday, August 4th

WEEK FIVE:

(Aug. 4 – Aug. 11)

Chapter 12: Drugs, Drug Analysis & Forensic Toxicology

Chapter 13: Materials Evidence

Exam #5: Thursday, August 11th