FORENSIC SCIENCES

As part of the Columbian College of Arts and Sciences' natural, mathematical, and biomedical sciences programs, forensic sciences provides an understanding of the integration of forensic disciplines with the investigation of criminal activity, while providing an overview of the analytical methods, procedures, equipment, and data used by forensic specialists. Coursework emphasizes the identification and analysis of evidence as well as the interpretation and reporting of the results.

The master of forensic sciences (MFS) degree is offered in the fields of forensic chemistry and forensic molecular biology. The field of forensic chemistry is intended for students who are interested in a career in forensic drug analysis and/or trace evidence, while the field of forensic molecular biology is intended for students interested in a career in forensic DNA analysis. Students interested in pursuing a career as forensic scientists in other fields, for example latent fingerprint examination, firearm and toolmark identification, or questioned document examination, should complete the master of forensic sciences degree without selecting a field.

The master of science (MS) degree is offered in the field of crime scene investigation. In addition, a graduate certificate is offered in forensic investigation.

GRADUATE

Master's programs

- Master of Forensic Sciences (https://bulletin.gwu.edu/arts-sciences/forensic-sciences/ma/)
- Master of Forensic Sciences in the field of forensic chemistry (https://bulletin.gwu.edu/arts-sciences/forensic-sciences/mfs-forensic-chemistry/)
- Master of Forensic Sciences in the field of forensic molecular biology (https://bulletin.gwu.edu/arts-sciences/forensic-sciences/mfs-forensic-molecular-biology/)
- Master of Science in the field of crime scene investigation (https://bulletin.gwu.edu/arts-sciences/forensic-sciences/ms-crime-scene-investigation/)

CERTIFICATE

Graduate certificate programs

- Forensic investigation (https://bulletin.gwu.edu/arts-sciences/forensic-sciences/certificate-forensic-investigation/)
- Latent print examination (https://bulletin.gwu.edu/arts-sciences/forensic-sciences/certificate-latent-print-examination/)

FACULTY

Professors: D. Podini (*Chair*), I.S. Lurie, W.F. Rowe, H. Eldridge, M Foley, E. Lewis (Research)

Professorial Lecturers: E. Bernard, N. Galbreth, D. O'Neil, L. O'Daniel, J. Karschner, T. Bille, B. Adams, M. Ambrosino, M. Spence, S. Kingsbury, S. Gittelson, V. Weedn,

COURSES

Explanation of Course Numbers

- Courses in the 1000s are primarily introductory undergraduate courses
- Those in the 2000s to 4000s are upper-level undergraduate courses that can also be taken for graduate credit with permission and additional work assigned
- Those in the 6000s and 8000s are for master's, doctoral, and professional-level students
- The 6000s are open to advanced undergraduate students with approval of the instructor and the dean or advising office

FORS 2104W. Introduction to Forensic Sciences. 3 Credits.
Topics in the application of science to the criminal justice system, including personal identification, analysis of drugs, forms of trace evidence, identification of biological fluids, forensic pathology, and forensic toxicology. Includes a significant engagement in writing as a form of critical inquiry and scholarly expression to satisfy the WID requirement.

FORS 2107. Fundamentals of Forensic Science. 4 Credits.
The application of science to the criminal justice system. Recognizing, analyzing, and interpreting evidence specific to fields such as CSI, fingerprint/trace evidence analysis, analysis of drugs, biological fluids, entomology.

FORS 5099. Variable Topics. 1-99 Credits.

FORS 6001. Research and Professional Responsibility. 3 Credits.
Introduction to the two key principles for forensic science graduate students: How to begin a research project and how to conduct oneself with the utmost professional responsibility, including behaving ethically and understanding quality systems. Restricted to graduate students in the Department of Forensic Sciences.

FORS 6004. Fundamentals of Forensic Science I. 3 Credits.
This course surveys crime scene investigation techniques, medicolegal death investigation, and patterned evidence examination. This satisfies the 10 hours instruction for a FEPAC accredited MFS degree in the core topics of crime scene investigation, physical evidence concepts, and pattern evidence. This course helps students prepare for the American Board of Criminalistics ("ABC") examination in the disciplines of firearms and toolmarks, fingerprints, and questioned documents. Lectures are given by faculty members and guest lecturers who are subject matter experts on the topic presented. This course includes a four hour laboratory (fingerprints). This is a required course for MFS and CSI students. This course, along with FORS 6005 Fundamentals of Forensic Science II, replaces FORS 6213, Elements of Forensic Science (3 Credits). Prerequisite: None.

FORS 6005. Fundamentals of Forensic Science II. 3 Credits.
This course surveys the traditional crime laboratory (criminalistics) disciplines—specifically forensic drug chemistry, forensic toxicology, trace evidence, fire debris, explosives, and forensic molecular biology. This satisfies the 10 hours instruction for a FEPAC accredited MFS degree in the core topics of analytical chemistry and instrumental methods of analysis, drug chemistry/toxicology, microscopy and materials analysis, and forensic biology. This course helps students prepare for the American Board of Criminalistics ("ABC") examination in the disciplines of forensic biology, trace evidence, fire debris, controlled substances, and toxicology/blood alcohol determinations.

FORS 6010. Bloodstain Pattern Analysis and Crime Scene Reconstruction. 3 Credits.
Describing specific aspects of bloodstain pattern analysis and crime scene reconstruction process. Applying scientific method and event analysis to crime scene reconstruction. Includes laboratory exercises. Restricted to graduate students. Recommended background: FORS 6251 and FORS 6256.

FORS 6011. Bloodstain Pattern Analysis II. 3 Credits.
Continuation of the concepts learned in FORS 6010. Serving as an expert witness; refining blood pattern analysis and documentation skills; effectively communicating observations, analysis, and conclusions in the courtroom. Laboratory fee. Restricted to graduate students. Prerequisites: FORS 6010. Recommended background: FORS 6251 and FORS 6256.

FORS 6020. Ethics, Professional Responsibility, and Quality Assurance. 2 Credits.
Issues of forensic science laboratory professional responsibility, including ethics, public policy, and quality assurance. Satisfies 10 hours of instruction for a Forensic Science Education Programs Accreditation Commission (FEPAC) accredited MFS degree in the core topics of ethics and professional responsibility and quality assurance; also assists in preparation for the American Board of Criminalistics examination in the area of ethics. Taken online during the summer session.

FORS 6075. When Forensic Science Gets it Wrong. 3 Credits.
A discussion-based course examining criticisms of forensic science. Court challenges are often based on the reliability of a discipline. We will discuss common criticisms, distinguish the valid from the overblown, and consider response strategies. Restricted to Forensic Sciences Students.

FORS 6201. Forensic Biology. 3 Credits.
Principles of the forensic analysis of blood and other biological materials. Specific procedures and techniques used in forensic biology and serology. Laboratory fee.

FORS 6203. Examination of Questioned Documents. 3 Credits.
Theory and principles of handwriting and handprinting, duplicating processes, paper manufacture and fiber analysis; studies of paper and methods of examining questioned documents. Laboratory fee.

FORS 6204. Firearms and Toolmark Identification. 3 Credits.
Methods for identifying firearms, bullet cartridge casings, toolmarks, gunshot residue, obliterated serial numbers, tire marks, and footprints. Laboratory fee.

FORS 6206. Trace Evidence Analysis. 3 Credits.
Principles that govern the analysis of trace evidence, including recovery, transference, interpretation, and comparison. Assessment of evidentiary value, reporting, and court testimony. Laboratory fee.

FORS 6207. Photography in the Forensic Sciences. 3 Credits.
Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions. Laboratory fee.

FORS 6210. Advanced Instrumental Analysis. 3 Credits.
Theory and practice of modern instrumental methods used in forensic laboratories, including mass spectrometry, optical spectroscopy, microscopy, chromatographic and electrophoretic separations. It is a required course for MFS students with concentration in Forensic Chemistry and Forensic Toxicology. Recommended background: undergraduate analytical methods.

FORS 6215. Latent Print Comparisons I. 3 Credits.
An overview of the history and biology of, and principles underlying, latent print comparisons. Begin developing decision thresholds and documentation practices and complete beginning and intermediate level comparisons of finger and palm impressions. Restricted to graduate students in the Department of Forensic Sciences or with the permission of the instructor.

FORS 6216. Latent Print Processing. 3 Credits.
Mixing reagents and selecting appropriate reagents and physical processing techniques to maximize the effective development of latent prints on a variety of surfaces. Setting up a validation study for methods new to the lab. Restricted to graduate students in the Department of Forensic Sciences or with the permission of instructor.

FORS 6217. Latent Print Comparisons II. 3 Credits.
Students continue to build skills in latent print comparison by facing increasingly challenging samples, interpreting distortion, and refining decision thresholds. Restricted to graduate students in the Department of Forensic Sciences or with the permission of the instructor. Prerequisites: FORS 6215.

FORS 6219. Digital Image Processing. 3 Credits.
Digital images of marginal value can be processed to reveal details which had been in the original, but were difficult to see. These changes must be done in ways to survive court challenges. Best practices for doing so are provided. Prerequisites: FORS 6207 or permission of the instructor. Recommended background: graduate level work in MS/CSI, MFS/FRA, MS/FRA or Grad Cert in Forensic Investigations; graduate-level work in crime scene investigation and/or friction ridge analysis, or in the graduate certificate program in forensics investigations.

FORS 6224. Criminal Law for Forensic Scientists. 3 Credits.
Overview of criminal law offenses, law procedures, issues of evidence recovery, admissibility of scientific evidence, expert testimony, with an emphasis on criminal process and forensic science. A moot court experience is integral in this course.

FORS 6225. Statistics for Forensic Scientists. 3 Credits.
Statistics with a focus on forensic applications. Emphasis on the Bayesian approach. Logical, probabilistic statistical reasoning skills, and R software skills. Course content is the basis for an examination question on the comprehensive examination. Prerequisite: An undergraduate statistics course.

FORS 6230. Communicating About Latent Prints. 3 Credits.
Examination of common challenges to latent print testimony and common logical fallacies to improve ability to defend the science in court. Students practice public speaking skills and are prepared for moot court exercises. Restricted to graduate students in the Department of Forensic Sciences. Recommended background: FORS 6215.

FORS 6236. Forensic Toxicology. 3 Credits.
Core principles and modern analytical techniques in forensic toxicology. The role of the forensic toxicologist in MDI and human performance cases. Focus on sample collection, analysis, data interpretation, and expert testimony. Prerequisites: FORS 6210.

FORS 6238. Forensic Chemistry I. 3 Credits.
Examination of glass and soils. Laboratory exercises include refractive index measurements using immersion methods; polarized light observations of minerals; x-ray diffraction analysis of minerals; and classical chemical and physical methods of analysis. Laboratory fee.

FORS 6239. Forensic Chemistry II. 3 Credits.
Examination of arson accelerants, textile fibers, plastics, and paints. Laboratory exercises include infrared spectrometry and pyrolysis–gas–liquid chromatography of polymeric materials, as well as classical chemical and physical methods of analysis. Laboratory fee. Prerequisites: FORS 6238 or permission of the instructor.

FORS 6240. Forensic Drug Analysis. 3 Credits.
Examination of dosage forms of drugs. Laboratory exercises include color spot tests, crystal tests, infrared spectrometry and gas chromatography-mass spectrometry. Laboratory fee.

FORS 6241. Forensic Molecular Biology I. 3 Credits.
Techniques of molecular biology applied to the collection, examination, analysis, and interpretation of biological evidence.

FORS 6242. Forensic Molecular Biology II. 3 Credits.
Advanced methods of forensic molecular biology. Laboratory examinations and classifications of dried blood and other biological materials through a variety of nuclear and mitochondrial markers. Laboratory fee. Prerequisites: FORS 6241 and permission of the instructor.

FORS 6243. Forensic Molecular Biology III. 3 Credits.

FORS 6247. Population Genetics. 3 Credits.
Origin, maintenance, and possible significance of genetic variation in populations. Selection, genetic drift, and population structure are emphasized. Both theoretical and applied aspects of population genetics are discussed. Same as BISC 6228.

FORS 6251. Crime Scene Investigation I. 3 Credits.
The foundations of crime scene investigations, including properly documenting a scene. Collecting, packaging, and labeling evidence, topics related to fingerprints, and other topics. Restricted to graduate students and undergraduate students with the permission of the instructor.

FORS 6252. Crime Scene Investigation II. 3 Credits.
Location, documentation, and preservation of evidence, such as trace, blood, and 2D/3D impression evidence. Bloodstain pattern analysis interpretation, shooting reconstruction, crime scene reconstruction, and other topics. Restricted to graduate students and undergraduates with the permission of the instructor. Prerequisites: FORS 6251.

FORS 6255. Investigation of Child Abuse. 3 Credits.
This course integrates medical, scientific, psychological, sociological and legal information for investigators and professionals involved in the field of child abuse. Special emphasis is placed on the application of research-supported data to situations involving the murder, abuse and exploitation of children.

FORS 6256. Forensic Pathology. 3 Credits.
Terminology and scientific techniques used in medico-legal investigations, sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma.

FORS 6257. Medicolegal Death Investigation. 3 Credits.
Medical, scientific, sociological, and legal methodologies applied to forensic investigations. Aspects of death scene analysis by a medical examiner, including autopsy procedures, unidentified remains, child death investigations, and mass disaster investigations. Laboratory fee. Prerequisites: FORS 6256 and permission of the instructor.

FORS 6290. Selected Topics. 3 Credits.
Current issues in research, investigation, and law.

FORS 6292. Graduate Seminar. 1 Credit.
Students in designated forensic sciences degree programs must register for this course in their first semester and again after completion of the required independent research project.

FORS 6295. Research. 1-12 Credits.
Research on problems approved by the department, under the supervision of an appropriate member of the program faculty. Admission by permission only.

FORS 6298. Forensic Sciences Practicum. 1-3 Credits.
Internship experience in a forensic science laboratory or criminal justice agency, under the supervision of an appropriate member of the program faculty. Students must preregister for this course. Admission by permission only.