FS - Forensic Sciences

Courses numbered 500 to 799 = *undergraduate/graduate*. (Individual courses may be limited to undergraduate students only.) Courses numbered 800 to 999 = *graduate*.

FS 581. Advanced Special Topics in Forensic Science (1-4).
An umbrella course created to explore a variety of subtopics differentiated by letter (e.g., 581A, 581B). Not all subtopics are offered each semester – see the course schedule for availability. Students enroll in the lettered courses with specific topics in the titles rather than in this root course. Prerequisite(s): CJ 191 or FS 298; junior, senior or graduate standing.

FS 701. Forensic Science Overview I Seminar (1).
Designed to introduce students to various forensic science disciplines, including forensic biology, crime scene investigation, latent prints, firearms and toolmarks, and questioned document examinations. The course provides students demonstrations of foundational lab tests and their application. Students have hands-on opportunities to conduct some of the foundational lab tests.

FS 702. Forensic Science Overview Seminar II (2).
Designed to introduce students to additional forensic science disciplines. Focuses on analytical chemistry (e.g., explosives analysis, fire debris analysis, drug chemistry and toxicology) and microscopy and materials analysis (e.g., trace examinations for hair, fibers, paint, etc.). The course exposes students to relevant instrumental methods and software and includes a discussion of the role of AI in forensic science.

FS 703. Professional Responsibility and Quality Assurance in Forensic Science (3).
Covers ethical considerations in forensic science work. Topics include professional conduct subject to ethics, the importance of using valid scientific work, bias, and the efforts to maintain high standards of quality assurance through laboratory accreditation. Emphasis is placed on the professional demands of handling evidence, as well as the history of various domestic and international forensic DNA testing standards.

FS 704. Applied Forensic Science Research Methods (3).
Designed to use applications of basic laboratory methods for the research of forensic science topics, with an emphasis on scientific writing, experimental design, data collection, review of examples of evaluation and analysis, communication skills, and critical thinking and publication review. The course also incorporates teachings relating to forensic validation and statistical applications in biology.

FS 710. Forensic Biology I (4).
Provides students with a foundational understanding of Deoxyribonucleic Acid (DNA), forensic biology and DNA analysis techniques. It introduces students to historical forensic biological analyses including Restriction Fragment Length Polymorphisms (RFLP) and ABO blood typing, and current testing technologies like multiplexing and Short Tandem Repeats (STR) analysis made possible through the discovery of the Polymerase Chain Reaction (PCR). The course further introduces students to techniques used in the collection of DNA from crime scene evidence, as well as DNA extraction. The lab portion of this course affords an opportunity for students to perform several lab tests associated with forensic biology. This course has a lab component.

FS 711. Forensic Biology II (3).
Educates students in modern techniques used in forensic DNA analysis and reviews emerging forensic biological laboratory techniques most likely to be implemented in forensic laboratories. Modern techniques include theory and history of quantification, PCR and genetic analysis. Other topics include current research in molecular applications that involve analysis of DNA, RNA, protein or other cell macromolecules and use of advanced molecular tools for analysis.

FS 720. Population Genetics (3).
Covers the theories and models of population genetics and how they are directly applied in forensic DNA typing and the interpretation of results. Students learn about the origin, maintenance and possible significance of genetic variation in populations. Emphasis is placed on how mutation, selection, drift and migration shape genetic variation, as well as population structure.

FS 721. Forensic Biology Serology and DNA Testing (3).
Presents the theory and methodology of modern and emerging techniques used for the examination and identification of body fluid stains, tissue types and species determinations. The course includes lecture and lab components, and instruction focuses on molecular biology techniques applied to a forensic DNA crime laboratory setting.

FS 740. Introduction to Firearms and Toolmark Examinations (3).
Provides an in-depth introduction to forensic firearms and toolmark examination. Students explore the scope of work performed by examiners in firearms and toolmark identification, to acquire a comprehensive understanding of the characteristics detected in fired ammunition components, to include the scope of work, characteristics analysis, microscopic comparison, terminology, examination protocols and restoration techniques.

FS 742. History of Firearm Examination (3).
Provides a comprehensive examination of the history and evolution of firearms identification. Students cover the development of muzzle-loading firearms and the history of black powder, highlighting their significance in the advancement of firearms technology, and delve into the historical background of firearms identification, focusing on key figures who have guided its evolutionary phases. Additionally, students explore the evolution of firearms identification and examination equipment, and learn the correct terminology used within the firearm and toolmarks forensic discipline. Pre- or corequisite(s): FS 740.

FS 744. Modern Firearms: Manufacture and Operating Systems (3).
Provides an in-depth exploration of the manufacture, mechanisms, assembly and operation of modern firearms. Students gain comprehensive knowledge of various firearm types, components, mechanisms and the principles behind their operation. The course is designed to equip students with the technical expertise necessary for forensic analysis and firearms examination. Pre- or corequisite(s): FS 742.

FS 746. Advanced Analysis of Firearms and Toolmark Examination I (3).
Delves into the forensic analysis of firearms and toolmarks, providing students with the skills and knowledge necessary to perform detailed examinations and comparisons. The course covers the examination of fired bullets, microscopic comparisons, fired shotshell projectiles, general rifling characteristics, toolmark examinations, and distinguishing between class and subclass. Pre- or corequisite(s): FS 744.

FS 747. Advanced Analysis of Firearms and Toolmarks Examination II (3).
Delves into the forensic analysis of firearms and toolmarks, providing students with the skills and knowledge necessary to perform detailed examinations and comparisons. The course covers the examination of fired bullets, microscopic comparisons to include 3D topography and virtual comparison microscopy (VCM), individual marks, and best

known non-match (KNM) concepts, and common range of conclusions. Prerequisite(s): FS 746.

FS 748. Court Testimony for Firearms and Toolmark Examiners and Research Project (2).
Provides an in-depth examination of the role of forensic experts in the courtroom, specifically focusing on firearm and toolmark examination. Students explore the legal and scientific principles underpinning the admissibility of forensic evidence, with a particular emphasis on the Daubert decision and other relevant legal precedents. The course also covers strategies used by opposing counsel to challenge the credibility and reliability of expert testimony. Additionally, students research and produce a technical research paper or project. Capstone course. Pre- or corequisite(s): FS 742.

FS 749. Forensic Validation and Laboratory Techniques (1).
Provides an in-depth exploration of laboratory skills and the validations used within the forensic science laboratory, emphasizing the critical skills and standards necessary for professional practice. Aligned with the Organization of Scientific Area Committees (OSAC) for Forensic Science standards and guidelines, this course covers essential topics such as documentation, laboratory skills, communication skills, examiner proficiency testing, validation processes, quality assurance, analytical procedures, reporting, peer reviews and analytical standards. Capstone course. Pre- or corequisite(s): FS 704.