FORENSCI SCIENCE (FRSC)

FRSC 202. Crime and Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces the scientific theory, concepts and practices used in any physical science by relating them to the analysis of physical evidence performed in forensic laboratories and the fundamentals of crime scene investigation, and their relationship to the criminal justice system and criminal investigations. Not applicable for credit toward the B.S. in Forensic Science.

FRSC 291. Topics in Forensic Science. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated with different topics for a maximum of six credits. A study of selected topics in forensic science. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

FRSC 300. Survey of Forensic Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151, BIOZ 151, CHEM 102, CHEZ 102 and UNIV 112, each with a minimum grade of C. Examines core principles and instrumentation used in forensic chemistry and microscopy, and the fundamentals of crime scene investigation. Also introduces ethical and quality assurance issues of crucial importance in modern crime laboratories.

FRSC 309. Scientific Crime Scene Investigation. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: FRSC 300 with a minimum grade of C. Enrollment is restricted to forensic science majors or by permission of instructor. Provides scientific theory of crime scene investigation and crime scene reconstruction and basic knowledge of proper crime scene protocol and evidence processing techniques. Includes the processes for documentation, collecting and preserving physical evidence.

FRSC 310. Forensic Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 210 or FRSC 300 with a minimum grade of C. A comprehensive overview of forensic anthropology including its development and the theory and methodology on which it is based. Crosslisted as: ANTH 310.

FRSC 325. Forensic Medicine. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FRSC 300 with a minimum grade of C. Enrollment is restricted to forensic science majors or by permission of instructor. An investigation of topics in death scene investigations as well as autopsy findings associated with natural and unnatural deaths.

FRSC 351. Forensic Science Service-learning. 2 Hours.
Semester course; 2 lecture hours. 2 credits. May be repeated for a maximum of four credits. Prerequisites: FRSC 300 and at least one additional FRSC/Z course, each with a minimum grade of C. Enrollment is restricted to forensic science majors or by permission of instructor. Provides an opportunity to learn about the community’s schools and how to teach forensic science concepts to school-aged students. Each week, VCU students will provide hands-on lab activities in community-based programs to reinforce lessons learned through school curricula. Reflective writing, partner assignments and a final presentation are required, in addition to 20 community partner hours. VCU students will improve their ability to explain forensic concepts to those with differing scientific backgrounds, have increased confidence when addressing audiences and deepen their understanding of civic responsibility.

FRSC 365. Forensic Microscopy. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: FRSC 300 with a minimum grade of C. An in-depth course in the theory and practical application of microscopy to the examination, identification and individualization of physical evidence submitted to forensic laboratories.

FRSC 375. Forensic Evidence, Law and Criminal Procedure. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151, BIOZ 151, CHEM 102, CHEZ 102 and UNIV 112, each with a minimum grade of C. The law of criminal procedure and rules of evidence as applied to forensic science. Topics will include scientific versus legal burdens of proof, legal terminology and trial procedure.

FRSC 385. Forensic Serology. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: CHEM 301 and FRSC 300, each with a minimum grade of C. Examines the application of basic chemical, biological, immunological and microscopic laboratory techniques to the examination and identification of body-fluid stains, including both presumptive and/or confirmatory identification of blood, semen, saliva, urine and feces. Applies methods that are used in forensic laboratories to identify the species of origin and includes a review of advanced methods for automated serological analysis. Laboratory exercises will supplement lectures to give students practical knowledge of the laboratory procedures.

FRSC 391. Topics in Forensic Science. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. A maximum total of six credits for all forensic science topics courses may be applied to the major. Prerequisite: FRSC 300 with a minimum grade of C. A study in selected topics in forensic science. See the Schedule of Classes for specific topics to be offered each semester and additional prerequisites.

FRSC 400. Forensic Chemistry. 4 Hours.
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Prerequisites: CHEM 409 and CHEZ 409, each with a minimum grade of C. Examines core principles and instrumentation used in forensic chemistry applications to include microchemical tests, gas chromatography, liquid chromatography, spectroscopy and mass spectrometry, with emphasis on forensic casework. These topics may include accelerants, explosives, paints, polymers and drug analysis. Students will gain experience in experimental design, operation and troubleshooting of instrumentation, as well as the analysis and interpretation of chromatographic and spectroscopic data sets.

FRSC 410. Forensic Pattern Evidence. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: FRSC 309 with a minimum grade of C. Enrollment is restricted to forensic science majors or by permission of the instructor. Covers topics in pattern evidence analysis including analysis of latent prints and impression evidence of footwear and tire treads as applied to forensic casework. Covers both the theoretical and practical aspects using lectures and laboratory exercises focusing on the visualization, examination and interpretation of pattern evidence.
FRSC 412. Forensic Analysis of Firearms and Toolmarks. 3 Hours. 
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: 
FRSC 300 with a minimum grade of C. Enrollment is restricted to forensic 
science majors or by permission of the instructor. An investigation of 
topics in firearms and toolmark examination for forensic applications. 
Covers both theoretical and practical aspects using lectures and 
laboratory exercises.

FRSC 438. Forensic Molecular Biology. 3 Hours. 
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 310 
with a minimum grade of C. Provides an understanding of molecular 
biology testing methodologies as applied to analysis of forensic samples. 
Current topics in forensic DNA analysis will include quality assurance, 
DNA databanking, contemporary research and population genetics. 
Crosslisted as: BIOL 438.

FRSC 445. Forensic Toxicology and Drugs. 4 Hours. 
Semester course; 2 lecture and 4 laboratory hours. 4 credits. 
Prerequisites: CHEM 301, CHEM 302, CHEZ 301 and CHEZ 302, each with 
a minimum grade of C. Provides a comprehensive overview of the basic 
principles of drug analysis and forensic toxicology. Students will perform 
hands-on lab exercises in these areas. Students will learn to identify the 
controlled substances and toxic agents most commonly abused and/or 
encountered in criminal investigations, including issues of interpretation 
and impairment.

FRSC 490. Professional Practices in Forensic Science. 3 Hours. 
Semester course; 3 lecture hours. 3 credits. Prerequisites: FRSC 300; 
and one additional FRSC or FRSZ course, each with a minimum grade 
of C. Enrollment is restricted to seniors in forensic science with at least 
85 credit hours toward the degree. An examination and evaluation 
of historical and current issues in the scientific analysis of physical 
evidence in criminal investigations. Individual and group activities 
relating to professional practices (ethics, quality control and testimony) 
of forensic scientists.

FRSC 492. Forensic Science Independent Study. 1-3 Hours. 
Semester course; 1-3 independent study hours. 1-3 credits. May be 
repeated for a maximum of six credits. Prerequisites: FRSC 301 and 
FRSC 300, each with a minimum grade of C. Enrollment is restricted 
to forensic science majors with at least sophomore standing and a 
minimum GPA of 2.5. Independent studies must be research-based. A 
determination of the amount of credit and the written permission of 
both the instructor and the program director must be procured prior to 
registration for the course.

FRSC 493. Forensic Science Internship. 1-3 Hours. 
Semester course; 1-3 field experience hours. 1-3 credits. Prerequisite: 
FRSC 300 with a minimum grade of C. Enrollment is restricted to 
forensic science majors with a minimum GPA of 2.75. An application 
is required in advance of admission with permission of the internship 
coordinator. Through placement in an approved organization, the student 
will obtain a broader, more practical knowledge of forensic science and 
its applications. Written progress and final reports are required. Graded as 
pass/fail.

FRSC 505. Forensic Entomology. 3 Hours. 
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Course 
focuses on proper collection, preservation and identification of 
entomological evidence. Students collect entomological evidence 
from a mock crime scene and utilize these specimens for estimation 
of minimum postmortem interval. There is a significant laboratory 
component.

FRSC 510. Developmental Osteology. 3 Hours. 
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: 
FRSC 300; ANTH 307 and ANTZ 307; ANTH 310; graduate standing 
in forensic science; or permission of instructor. Examines the human 
musculoskeletal system and its development from an embryonic state 
to the adult form. Students learn the developmental course of each 
bone in the human skeleton and those of the associated soft tissue 
structures. Students are provided with training in the recognition of 
skeletal elements and bony landmarks, siding skeletal elements (and 
fragments thereof), knowledge of muscle structure and function and 
knowledge of nervous and venous structures associated with bony 
landmarks. Developmental defects and trauma associated with birth 
and child abuse are discussed. Juvenile age estimation from bones and 
radiographic images are emphasized.

FRSC 515. Forensic Anthropology Applications. 3 Hours. 
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Focuses on 
estimation of the biological profile in human identification, the analysis 
of perimortem trauma and writing of case reports. The laboratory 
component will cover all aspects of the course including providing 
practice for age and race estimation.

FRSC 520. Forensic Fire Investigation. 3 Hours. 
Semester course; 3 lecture hours. 3 credits. Prerequisite: FRSC 375 
with a minimum grade of C (for undergraduate students), FRSC 670 or 
equivalent. Examines the specialized field of forensic fire investigation 
including on-scene investigation, fire theory, accelerant-assisted burn 
patterns and expert-witness testimony.

FRSC 565. Scientific Crime Scene Investigation. 3 Hours. 
Semester course; 3 lecture and/or laboratory hours. 3 credits. Presents 
the theory and techniques of scientific crime scene investigation 
including: recognition, documentation, collection and enhancement of 
physical evidence. A comprehensive introduction to the use of physical 
evidence for crime scene reconstruction is presented.

FRSC 566. Advanced Crime Scene Investigation. 3 Hours. 
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: 
FRSC 309 with a minimum grade of C (for undergraduate students), 
FRSC 565 or equivalent. An advanced study of the methods and 
techniques of crime scene investigation with an emphasis on crime 
scene reconstruction by the use of physical evidence. Course will include 
extensive practical applications with mock crime scenes.

FRSC 570. Forensic Science Seminar. 1 Hour. 
Semester course; 1 lecture hour. 1 credit. May be repeated for a 
maximum of 3 credits. A seminar course featuring presentations by 
faculty, crime laboratory staff, students and visiting lecturers. Instruction 
includes discussions of research and developments and current topics in 
various forensic science disciplines and related fields. Graded as S/U.

FRSC 580. Applied Statistics for Forensic Science. 3 Hours. 
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 210, 
STAT 212 or equivalent statistics knowledge; or graduate standing 
in forensic science. The course will focus on the forensic applications of 
data visualization methods, hypothesis testing, analysis of variance, 
correlation measures, regression, multivariate analyses and concepts 
in database "matching" procedures. Techniques discussed will 
include ANOVA, MANOVA, principal component analysis, non-metric 
multidimensional scaling, discriminant function analysis and machine 
learning/neural network analysis.
FRSC 581. Forensic Analysis of Fire Debris and Explosive Evidence. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits.
Prerequisites: CHEM 409, CHEZ 409 and FRSC 365; or FRSC 671,
FRSZ 671, FRSC 673 and FRSZ 673. Covers topics in polymer analysis
including collection, classification and analysis of paint and fiber
evidence as applied to forensic casework. The course covers the
theoretical and practical aspects, using lectures and laboratory
exercises. Laboratory exercises include hands-on instruction with
appropriate instrumentation and techniques, including stereomicroscopy, gas and ion
chromatography, GC-MS, thin layer chromatography, HPLC and FT-IR.

FRSC 582. Forensic Analysis of Paint and Fiber Evidence. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits.
Prerequisites: CHEM 409, CHE 409 and FRSC 365; or FRSC 671,
FRSZ 671, FRSC 673 and FRSZ 673. Covers topics in polymer analysis
including collection, classification and analysis of paint and fiber
evidence as applied to forensic casework. The course covers the
theoretical and practical aspects, using lectures and laboratory
exercises. Laboratory exercises include hands-on instruction with
appropriate instrumentation and techniques, including stereomicroscopy, microchemical
testing, microspectrophotometry, fluorescence microscopy, FT-IR and polarizing light microscopy.

FRSC 591. Topics in Forensic Science. 1-3 Hours.
Semester course; variable lecture hours. 1-3 credits; maximum of 6
credits for all forensic science topic courses may be applied to major.
Prerequisite: graduate standing in the forensic science program or
permission of instructor required for enrollment. A study in selected
topics in forensic science. See the Schedule of Classes for specific topics
to be offered each semester and additional prerequisites.

FRSC 607. Forensic Taphonomy. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Focuses on
the process and sequence of human decomposition, as well as the burial,
water disposal and surface dispersal of human remains. The course
covers current issues in taphonomic research and practical application,
including both domestic and international examples of mass disasters
and mass graves. An understanding of the principles of archaeological
stratigraphy is an integral part of the course. There is a significant field
work and laboratory component.

FRSC 644. Analytical Considerations in Forensic Toxicology. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Lecture
and laboratory will focus on the development and validation of
advanced analytical methods in forensic toxicology. Data analysis and
interpretation and the application of statistical tools will be discussed.
Lectures will also provide the fundamentals of pharmacokinetics and
toxicokinetics and dynamics as they pertain to forensically relevant
chemicals and psychoactive substances.

FRSC 645. Applications in Forensic Toxicology. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisite:
FRSC 644. Lecture and laboratory focused on the toxicokinetics and
toxicodynamics of categories and specific chemicals and psychoactive
substances. Sample preparation, instrumental analysis and professional
practices relevant to post-mortem toxicology, surveillance drug testing
and drug-facilitated crimes will be discussed.

FRSC 660. Toolmark Examinations. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits.
Prerequisites: FRSC 673 and FRSZ 673 or permission of instructor.
Covers topics in toolmark examination and identification as applied to
forensic casework. The course covers both the theoretical and practical
aspects, using lectures and laboratory exercises.

FRSC 661. Analysis of Pattern Evidence. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits.
Prerequisites: FRSC 673 and FRSZ 673 or equivalents. Covers topics in
pattern evidence analysis including analysis of latent prints and other
patterned evidence as applied to forensic casework. The course covers
both the theoretical and practical aspects, using lectures and laboratory
exercises focusing on the collection, analysis and interpretation of
pattern evidence.

FRSC 662. Firearm Identification. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits.
Prerequisites: FRSC 673 and FRSZ 673 or equivalents. Covers topics in
firearm identification as applied to forensic casework. The course covers
both the theoretical and practical aspects, using lectures and laboratory
exercises.

FRSC 663. Forensic Medicine. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the fundamentals of
forensic medicine including topics such as forensic death investigations,
postmortem changes, time-of-death determinations, identification of
unknown human remains and the forensic pathology of natural
and traumatic deaths in adults and children. The characteristics
and diagnosis of various types of trauma as well as the characteristics
of common natural diseases that cause sudden death will be presented.

FRSC 670. Forensic Evidence and Criminal Procedure. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Presents the law of criminal
procedure and rules of evidence as applied to forensic science. Explores
issues of scientific versus legal burdens of proof, legal terminology and
trial procedure.

FRSC 671. Instrumentation in Forensic Chemistry. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Corequisite: FRSZ 671.
Enrollment is restricted to students in the forensic science program.
Theory and applications of chromatography, mass spectrometry and
spectroscopy as used in modern crime laboratories. Instruction will focus
on instrumental analysis as applied to drug analysis, toxicology, fire
debris identification and general trace evidence examination.

FRSC 672. Advanced Drug Analysis. 3 Hours.
Semester course; 3 lecture and/or laboratory hours. 3 credits. Isolation
and identification of abused drugs emphasizing the analysis of
unknowns, problems encountered in analysis and chain of custody
issues.

FRSC 673. Forensic Microscopy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Establishes the foundation
for the theory of microscopy. The knowledge acquired in this course
can be applied to forensic disciplines such as firearms examinations,
forensic biology, controlled substances, questioned documents and trace
evidence.

FRSC 675. Forensic Serology and DNA Analysis. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Presents the theory and
methodology used for the examination and identification of body fluid
stains and determination of species. Provides students an introduction to
the theory and methodology of forensic DNA analysis as well as forensic
DNA quality control issues. Instruction will focus on molecular biology
techniques as they are applied in a forensic DNA crime laboratory setting.
FRSC 676. Advanced Forensic DNA Analysis. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Focuses on the specific principles and modern procedures used for analysis of forensic nuclear and mitochondrial DNA evidence. Other topics include current research and development for forensic DNA instrumentation and applications, statistical interpretation of results and case report writing. Students gain individualized, hands-on experience with DNA procedures and instrumentation in the laboratory exercises. Students will process mock forensic casework.

FRSC 677. Professional Practices and Expert Testimony. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: must have successfully completed a minimum of 18 credit hours in the forensic science master's degree program. Topics related to professional practices in the forensic science field will be covered, including ethics, bias, quality assurance, laboratory management and professional development. Individual and group activities relating to these topics will be completed. Additionally, this course will examine forensic expert testimony in the courtroom, communication of scientific findings to a general audience, trial preparation and cross-examination in moot court format.

FRSC 680. Forensic Psychology. 3 Hours.

FRSC 686. Emerging Molecular Applications for Forensic Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FRSC 676. Emerging forensic molecular technologies as well as molecular applications for nontraditional forensic needs will be covered. Emphasis will be given to current research and to technologies most likely to be implemented in forensic laboratories. Molecular applications may include those that involve analysis of DNA, RNA, protein, or other cell macromolecules and/or those that use advanced molecular tools for separation, detection, manipulation, identification, imaging and analysis. Students gain individualized experience in literature research, in summarization/simplification of technical information and in oral presentation.

FRSC 690. Scientific Writing. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment restricted to students in the M.S. in Forensic Science program. Focuses on scientific writing techniques, including abstracts, posters, review articles and research proposals. Emphasis will be placed on writing for scientific journals in forensic science and other peer-reviewed journals.

FRSC 692. Forensic Science Independent Study. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Maximum credit for all independent study applicable to degree is 6 credits. The amount of credit must be determined, and written permission of instructor and program director must be obtained prior to registration. This course is designed to provide an opportunity for independent laboratory research in an area of forensic science or related scientific discipline. The end products of this experience will include an oral presentation at a campus seminar and a written report.

FRSC 693. Current Topics in Forensic Science. 1 Hour.
Semester course; 1 lecture hour. 1 credit. May be repeated for credit. A course designed to develop skills in reading journal manuscripts and delivering oral presentations in conjunction with an in-depth study of a current topic in forensic science. Student will conduct library research, present talks and lead discussions on the selected topic. See the Schedule of Classes for specific current topics course to be offered each semester and prerequisites.

FRSC 792. Research Techniques. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Enrollment restricted to students with graduate standing in forensic sciences and with permission of faculty mentor. Application of basic laboratory methods used in forensic science to the investigation of topics of interest. Emphasis on experimental design, data collection and analysis, communication skills, and critical thinking. Graded as Satisfactory/Unsatisfactory.

FRSC 793. Directed Research in Forensic Science. 1-3 Hours.
Semester course; 1-3 practicum hours. 1-3 credits. May be repeated for credit with up to 6 credits counted toward the degree requirements. Enrollment restricted to students in the forensic science master's degree program with permission of the instructor. A capstone course in which students will conduct independent, original laboratory research in a forensic specialization area of interest, while also gaining practical experience in crime laboratory practices and methods. A minimum of 300 hours of laboratory research and a minimum of three credits are required for graduation.