Forensic and Investigative Science, Forensic Science

Degrees Offered

- Master of Science
- Doctor of Philosophy

Nature of the Program

**M.S. FORENSIC AND INVESTIGATIVE SCIENCE**

The objective of the M.S. degree is to prepare students for employment in local, state, and federal forensic science laboratories in several forensic disciplines. The M.S. degree is a rigorous, quantitative, research oriented degree accredited by the Forensic Science Education Programs Accreditation Commission (FEPAC).

The coursework comprises a core of advanced chemistry, biology and pattern evidence courses, including laboratory-based instruction in microscopy, trace evidence, analytical chemistry, DNA, statistics and laboratory management. Further specialization occurs though the student's research. The learning and research environments are supported by state-of-the-art instrumentation and laboratory facilities.

**PH.D. FORENSIC SCIENCE**

The objective of the Ph.D. program is to prepare students to work as professionals in academia, government laboratories, and private industry as laboratory specialists. Students will learn to critically assess the current state of knowledge within the field, and to solve complex problems at the frontier of the discipline. The major component of the program is research. The coursework comprises a core of advanced chemistry, biology and pattern evidence courses, including laboratory-based instruction in microscopy, trace evidence, analytical chemistry, DNA, statistics and laboratory management.

**FACULTY**

**CHAIR**

- Casper Venter - Ph.D. (University of South Africa)

**GRADUATE STUDIES COORDINATOR**

- Tina Moroose - M.S. (Marshall University)

**PROFESSORS**

- Glen Jackson - Ph.D. (West Virginia University)
  Ming Hsieh Distinguished Professor, Forensic Chemistry and Mass Spectrometry
- Keith Morris - Ph.D. (University of Port Elizabeth)
  Ming Hsieh Distinguished Professor, Impression Evidence, Evidence Interpretation

**ASSOCIATE PROFESSORS**

- Jaqueline Speir - Ph.D. (Rochester Institute of Technology)
  Informatics, Pattern Analysis, Image Analysis
- Casper Venter - Ph.D. (University of South Africa)
  Director, Undergraduate Coordinator, Seized Drugs, Latent Fingerprint Development and Comparison
- Tina Moroose - M.S. (Marshall University)
  DNA Analysis and Quality Assurance

**ASSISTANT PROFESSORS**

- Luis Arroyo - Ph.D. (Florida International University)
  Toxicology, Environmental Forensics
- Robin Bowen - Ed.D. (West Virginia University)
  Ethics, Bloodstain Pattern Analysis
- Tiffany Edwards - M.S. Forensic Science (University of Central Oklahoma)
- Roger Jeffreys - M.S. (West Virginia University)
- Rachel Mohr - Ph.D. (Texas A&M University)
Admissions

The M.S. and the Ph.D. are separate degree programs and students should carefully consider which is the most appropriate for their career goals. The M.S. degree is ideal preparation for work in local, state, and federal forensic laboratory systems. The Ph.D. is geared toward preparing students for research-intensive positions, academic appointments, and laboratory management. Enrollment is limited and competitive. Meeting minimum requirements does not guarantee acceptance. Acceptance into the M.S. or the Ph.D. program is by the vote of the Graduate Committee.

M.S. IN FORENSIC AND INVESTIGATIVE SCIENCE

Applicants to the M.S. program should possess a bachelor’s degree in natural science, Forensic Science, or equivalent, which includes at least one year of the following courses: Fundamentals of Chemistry (inclusive of laboratories); Organic Chemistry (inclusive of laboratories); Biology (inclusive of laboratories); Physics (inclusive of laboratories); and Calculus. Applicants should have a minimum cumulative GPA of 3.0 on a 4.0 scale and should submit transcripts from all prior institutions attended. GRE scores are required, with a score of 300 or better (on combined verbal and quantitative reasoning). Two letters of recommendation from persons who can address potential for success in graduate study and research must be submitted.

Applicants must submit an original writing sample of approximately 4-6 pages. The writing sample may be one or more of the following: a peer-reviewed publication where the applicant was the lead author, an honors thesis, research report or capstone report in which the applicant is the sole author, or an essay discussing one of the following statements (1.5 line spacing, Times New Roman, 12 point font): “DNA will eventually replace trace evidence as a technique in forensic science” or “Forensic Science will survive criticism about its reliability.” All applicants should apply a personal statement that addresses the following questions: why do you wish to pursue graduate studies in Forensic Science? What is your present concept of Forensic Science? What are your academic goals in the M.S. program? What are your professional goals and employment objectives? Additionally, the personal statement must indicate which faculty member in the department you would most like to work with and the work you would most like to do; indicate your second choice if you are not able to work with this faculty member. Information of faculty and their research interests can be found here (https://forensics.wvu.edu/faculty-and-staff/).

PH.D. IN FORENSIC SCIENCE

Students with a B.S. degree can be directly admitted to the Ph.D. program through the usual admission process. Students are encouraged to complete the M.S. degree prior to applying to the Ph.D. program. Current students in the FIS M.S. program who decide to pursue a Ph.D. must submit a completed application by the deadline to be considered for admission. Current enrollment in the FIS M.S. program does not guarantee acceptance into the Ph.D. program. Placement in a specific research group or with a specific faculty member is not guaranteed. Students, particularly those applying to the Ph.D. program, are strongly encouraged to contact faculty prior to submission of their application to discuss research interests and space availability in their research group. At least two potential research advisors must be identified as part of the admission process.

Applicants to the Ph.D. program should possess a bachelor’s or master’s degree from an accredited college or university (research-based) which includes the prerequisite coursework indicated about for the M.S. program. Applicants should have a minimum cumulative GPA of 3.0 on a 4.0 scale and should submit transcripts from all prior institutions attended. GRE scores are required, with a score of 300 or better (on combined verbal and quantitative reasoning). Three letters of recommendation from persons who can address potential for success in graduate study and can directly comment on the applicant’s academic and research skills must be submitted.

Applicants must submit an original writing sample, which may be one or more of the following: a peer-reviewed publication where the student is the lead author; thesis research converted to a publication-ready document (note that this document must conform to a pre-print to be submitted to a peer reviewed journal [such as JFS or FSI], and should include appropriate subsections and be of reasonable length); or thesis research proposal converted to a white paper (maximum length of 6 pages, single-spaced). All applicants should include a personal statement that addresses the following questions: why do you wish to pursue graduate studies in Forensic Science? What is your present concept of Forensic Science? What are your academic goals in the Ph.D.? What are your professional goals and employment objectives? Additionally, the personal statement must indicate which faculty member in the department you would most like to work with and the work you would most like to do; indicate your second choice if you are not able to work with this faculty member. Information of faculty and their research interests can be found here (https://forensics.wvu.edu/faculty-and-staff/).

List of Admission Requirements for the M.S.:

- See the steps to apply for admissions and access the application here (https://graduateadmissions.wvu.edu/how-to-apply/)
- Two letters of recommendation from professional or academic referees
- Writing sample
- Curriculum Vitae
- Personal Statement
- Official Transcripts and GRE scores
List of Admission Requirements for the Ph.D.:

- See the steps to apply for admissions and access the application here (https://graduateadmissions.wvu.edu/how-to-apply/)
- Three letters of recommendation from professional or academic referees
- Writing Sample
- Curriculum Vitae
- Personal Statement
- Official Transcripts and GRE scores

International Applicants:

- See the steps to apply for admissions and access the application here (https://graduateadmissions.wvu.edu/how-to-apply/)
- International applications should view additional requirements here (http://catalog.wvu.edu/graduate/graduateeducationatwestvirginiauniversity/internationaltext) and here (https://graduateadmissions.wvu.edu/how-to-apply/apply-for-2020-2021/international-graduate-applicant/)
- Language proficiency is required in order to hold a graduate teaching assistantship. See here (https://elli.wvu.edu/testing-resources/english-proficiency-gtas/)

Application Deadlines:

- The Department of Forensic and Investigative Science generally admits graduate students for the Fall semester. Admissions for Spring semester may be considered on a case-by-case basis; contact the Graduate Studies Coordinator before submitting.
- Applications are considered starting in January for admission for the following Fall semester
- Priority will be given to completed applications received by January 15th; application reviews will be continued past the deadline on a space-available basis
- Upon receipt and evaluation of the complete application package, suitable candidates may be invited for a final interview with the graduate committee
- Exceptional applicants to the Ph.D. program may be nominated by the Department of Forensic and Investigative Science for competitive University Fellowships. Late applicants cannot be considered for University Fellowships. Qualified applicants will be notified if they are nominated. More information on WVU fellowships can be found here (https://graduateeducation.wvu.edu/fellowships/)

Incomplete application packages will not be considered. Certain application requirements may be waived based on a preliminary review of an application by the program.

MS Major Code: 1479

PhD Major Code: 14C2

For specific information on the following program, please see the link to the right:

- Forensic and Investigative Science, M.S.

For specific information on the following program, please see the link to the right:

- Forensic Science, Ph.D.

Degree Progress

All students should identify a faculty mentor and research topic as soon as possible. The faculty mentor will work with the student to develop a Plan of Study, constitute an advisory committee, and formulate research plans. Details on the composition and establishment of an advisory committee, timelines, and expectations are provided in the Department’s Graduate Student Handbook.

MASTER'S BENCHMARKS

The proposal should be successfully defended on or before the last day for defenses as defined by the Eberly college (typically on or before April 15th for fall semester admits). Failure to do so may result in academic probation, and the student may be ineligible for departmental financial support. The student will be required to defend by the end of the summer. If this is not accomplished, steps may be initiated to dismiss the student from the program. For all others, please consult with the Coordinator of Graduate Studies.

Once completed, the proposal defense is valid for a maximum of 4 academic semesters. If the student has not defended the research described by the proposal within 4 academic semesters of the successful proposal defense date, he or she must repeat the proposal defense process, unless given written permission to continue by his or her Primary Investigator (PI) and the Graduate Committee.

DOCTORAL BENCHMARKS

Please refer to Degree Regulations, Time Limits in the WVU Graduate Catalog for more information.
The proposal defense should be conducted before the start of the second year of study, assuming completion of the core M.S. coursework. If the research proposal is not successfully defended, the student must reschedule the defense within one semester. Failure to successfully defend or schedule the second defense within one semester may be grounds for dismissal from the program. Once completed, the proposal is valid for a maximum of 6 academic semesters. If the student has not defended the research described by the proposal within 6 academic semesters of the successful proposal defense date, he or she must repeat the proposal defense process, unless given written permission to continue by his or her PI and the Graduate Committee.

Students should schedule their oral qualifying examination by the end of the fall of the second year (3 academic semesters, assuming successful completion of all core M.S. coursework). If unsuccessful in the first attempt of their oral examination, this examination must be repeated within one semester. Failure to successfully qualify or schedule the second oral examination within one semester is grounds for dismissal from the program.

Please refer to the Forensic and Investigative Science Graduate Handbook for more information.

COURSES

**FIS 501. Foundations of Criminalistics. 3 Hours.**
This course reviews the core theories and fundamental principles of criminalistics. Particular attention will be dedicated to problems of interpreting physical evidence. Aspects on research, scientific method, and ethics will also be addressed.

**FIS 502. Forensic Laboratory Management. 3 Hours.**
This course provides an overview of management issues in forensic science laboratories, including personnel and human resources, project management, leadership, organization, communication, strategy and budgeting.

**FIS 505. Biological and Chemical Evidence. 3 Hours.**
PR: Acceptance to the Forensic Justice LL M. The course will enable legal professionals to have a basic understanding of Chemical and Biological evidence in legal proceedings. It is a cross link between science and law and will close the existing gap between the two disciplines. The course will enable legal professionals to prepare for examination or cross examination of expert witnesses in legal proceedings.

**FIS 514. Forensic Impression & Trace Evidence. 3 Hours.**
PR: Admission to the Master of Laws (LLM) in Forensic Justice and FIS 480 with a minimum grade of C-. Introduction to the analysis and interpretation of forensic impression and trace evidence. Critical analysis skills for data collection methods, data interpretation, reporting structures, current challenges, and anticipated advances. Topics include: fingerprints, firearms, footwear, microscopy, hair, glass, and bloodstain pattern analysis.

**FIS 592. Directed Study. 1-6 Hours.**
PR: Consent. Directed study, reading, or research.

**FIS 602. Forensic Informatics. 3 Hours.**
This course will introduce the student to mathematical methods of forensic data analysis, including (1) digital imaging theory, (2) data pre-processing and exploitation methodologies (e.g., principle component analysis, frequency filtering, etc.) and (3) classical and post classical decision metrics. Theoretical concepts will be supplemented by practical laboratory exercises. Basic algorithm development will also be discussed.

**FIS 610. Firearms Examination. 3 Hours.**
This course presents the fundamentals and advanced aspects of firearms related to evidence. Topics include the design, mechanism, and manufacture of firearms as well as interior, exterior and terminal ballistics. This course includes laboratory component.

**FIS 614L. Laboratory Trace Evidence Examinations. 1 Hour.**
PR or CONC: FIS 614 and a background in the fundamentals of chemistry and microscopy (inclusive of laboratories) equivalent to WVU’s FIS 340/341 and FIS 314 are necessary for success in this course. Hands-on laboratory designed to prepare students for the forensic examination of trace evidence. This course will guide students to develop analytical skills for the collection, recovery, preservation, analysis, and interpretation of trace materials commonly analyzed in crime laboratories (glass, paint, tapes and adhesives, gunshot residues, inks and paper, soil, fibers and hair).

**FIS 615. Questioned Document Examination. 3 Hours.**
This course will focus on handwriting comparisons, signatures, typewriting, and typescripts. Topics include erasures, additions and alterations, printed and photocopied documents and ink analysis. This course includes a laboratory component.

**FIS 620. Forensic Casework Practicum. 3 Hours.**
Students will manage mock cases involving multiple types of evidence. They will collect, analyze and interpret the evidence. Written reports on the case will be submitted to evaluation during a mock trial.

**FIS 632. Advanced Forensic Biology. 3 Hours.**
This course will provide students with the knowledge and skills to perform forensic DNA analyses. Topics include analytical methods and procedures, result interpretation and evidence assessment. This course includes a laboratory component.

**FIS 660. Advanced Forensic Chemistry. 3 Hours.**
This course covers the chemical analysis of a wide variety of forensic evidence types. Topics include statistics, sampling, data quality, calibration, sample preparation, instrumentation; drug analysis, toxicology and explosives. This course includes a laboratory component.

**FIS 692. Directed Study. 1-6 Hours.**
Directed study, reading, and/or research.
FIS 695. Independent Study. 1-9 Hours.
Faculty Supervised study of topics not available through regular class offerings.

FIS 696. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

FIS 697. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

FIS 702. Advanced Forensic Science. 3 Hours.
This course develops competency in two main areas: 1) the ability to evaluate the admissibility of forensic science techniques in legal casework, and 2) the ability to identify gaps in present-day scientific principles, policies and technologies within the core sub-disciplines of forensic science, including, but not limited to, forensic chemistry, biology, trace evidence and pattern sciences.

FIS 703. Research Design in Forensic Science. 3 Hours.
PR: Admission to the FIS Doctor of Philosophy program. Research Design in Forensic Science is an applied research and statistics based course established specifically for students in the FIS Doctor of Philosophy program. The course will prepare students for data analysis related to sampling, regression, outlier detection, univariate significance testing, propagation of uncertainty, multivariate classification, classifier evaluation, Bayesian reasoning, data standardization and significance reporting.

FIS 792. Directed Study. 1-6 Hours.

FIS 796. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

FIS 797. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation.