Degrees Offered

- Master of Science
- Doctor of Philosophy

M.S. FORENSIC AND INVESTIGATIVE SCIENCE

The M.S. degree is accredited by the Forensic Science Education Programs Accreditation Commission (FEPAC) and is rigorous, quantitative and science-based.

The degree is unique in that it shares aspects of a professional education degree, such as an MBA, while retaining a very strong research component. Students are required to complete a minimum of 40 credit hours. The coursework is comprised of a core of advanced chemistry and biology courses and complemented with additional laboratory-based instruction in microscopy, analytical chemistry, impression evidence and other specialty courses such as trace evidence, pattern evidence, DNA analysis, forensic chemistry, and laboratory management.

An independent research project/thesis under the supervision of a faculty member is required. The learning and research environments are supported by state-of-the-art instrumentation and laboratory facilities.

This degree recognizes that future forensic scientists will need even greater education and training to work in national and state forensic laboratories.

All students should identify a faculty mentor and a research topic as soon as possible. In order to register for FIS 697 Research, the student must have successfully completed his or her thesis proposal defense.

Each student is responsible for ensuring that, with the assistance of the Coordinator of Graduate Studies, his or her committee is correctly constituted. Upon successful completion of the research, the candidate will present his or her results in a thesis and at the appropriate time defend the work in a final oral examination according to the rules of the College or University.

PH.D. FORENSIC SCIENCE

The objective of the Ph.D. program in Forensic Science is to prepare students to work as professionals in academia, government laboratories, and private industry as laboratory specialists. Through a core of advanced course work and a requisite independently executed research project, the program is designed to provide students with the skills needed to critically assess the current state of knowledge within the field, and to solve complex problems at the frontier of the discipline.

The program is strongly science-based and prepares students to work across the foundations of criminalistics; students learn the underpinnings of the discipline, research design, quantitative methods, statistical analysis, and communication skills such as scientific writing and presenting. Since students may enter the program with a wide array of backgrounds, Ph.D. candidates typically enroll in a common core of advanced forensic science courses, followed by additional courses as deemed necessary by their dissertation committees.

The program for the Ph.D. degree reflects a combination of prescriptive course work as well as a flexible, research-oriented approach geared to develop the interests, capability, and potential of the student. In addition to the curriculum for the MS degree, doctoral students are required to take three additional core courses and two colloquium courses. These courses present the essentials of a given discipline on an advanced level and expose the student to the frontiers in a specific area of research. The course offerings are designed to provide guidelines from which students can launch their independent research projects. Ph.D. students are required to enroll and participate in the departmental seminar program for at least six semesters. By doing so, it is anticipated that they will serve as role models for the graduate students in the M.S. program.

FACULTY

CHAIR

- Gerald Lang - Ph.D. (Rutgers University)

PROFESSORS

- Suzanne Bell - Ph.D. (New Mexico State University)
  Forensic Chemistry
- Glen Jackson - Ph.D. (West Virginia University)
  Ming Hsieh Distinguished Professor, Forensic Chemistry
ASSOCIATE PROFESSOR
• Keith Morris - Ph.D. (University of Port Elizabeth)
  Chemistry

ASSISTANT PROFESSORS
• Luis Arroyo - Ph.D. (Florida International University)
  Toxicology, Environmental Forensics
• Tina Moroose - M.S. (Marshall University)
  Graduate Studies Coordinator, Forensic Biology, Quality Assurance
• Robert O'Brien - M.S. (St. Joseph's University)
  Blood Stain Analysis, Crime Scene Analysis, Trace Evidence Analysis
• Jacqueline Speir - Ph.D. (Rochester Institute of Technology)
  Informatics
• Tatiana Trejos - Ph.D. (Florida International University)
  Trace Evidence, Forensic Chemistry

CLINICAL ASSISTANT PROFESSOR
• Casper Venter - M.S. (Northwest University)
  Director, Forensic Facilities, Controlled Substances, Toxicology

CLINICAL INSTRUCTOR
• Kelly Ayers - M.S. (West Virginia University)
  Director, Forensic Science Academy for Professionals, Forensic Photography, Crime Scene Analysis

TEACHING INSTRUCTOR
• Robin Bowen - M.S. (West Virginia University)
  Ethics
• Rachel Mohr - Ph.D. (Texas A&M University)
  Forensic Entomology

Admission Requirements

Master of Science Program

• A bachelor’s degree in natural science, forensic science, or equivalent which includes at least one year of the following courses:

  1. Fundamentals of Chemistry (inclusive of laboratories),
  2. Organic Chemistry (inclusive of laboratories),
  3. Biology (inclusive of laboratories),
  4. Physics (inclusive of laboratories), and
  5. Calculus

• On-line graduate application
• Departmental Application
• Official transcripts from all institutions of higher education attended
• GRE taken with in the last five years with a score of 300 or better.
• GPA of 3.0 or better on a 4.0 scale
• Department specific writing sample or published article
• Two letters of recommendation from persons who can address potential for success in graduate study and research

Upon receipt and evaluation of the application package, suitable candidates will be invited for a final interview with the graduate committee.

Applications will be accepted throughout the year on a rolling basis.

If the upcoming class is not filled by the fall or spring semester, we may entertain other applicants for admission to the MS program.

Doctor of Philosophy Program

• MS Degree from accredited college or university (research-based)
• On-line graduate application
• GPA of 3.0 or better on a 4.0 scale
• Eight MS Program courses or equivalent with a grade of C or better
• Research writing example: (1) peer-reviewed publication where the student is the lead author, (2) thesis research converted to a publication-ready document - note that this document must conform to a preprint to be submitted to a peer reviewed journal (such as JFS or FSI), including appropriate subsections and reasonable length, or (3) thesis research proposal converted to a white paper (maximum length of 6 pages, single-spaced)
• Three letters of recommendation (all three references must be able to comment on the applicant’s academic and/or research skillset)

Upon receipt and evaluation of the application package, suitable candidates will be invited for a final interview with the graduate committee.

For fall admission, the application deadline for the Ph.D. Program is January 15.

Late admissions will be evaluated on a case by case basis.

Master of Science

MAJOR REQUIREMENTS

Minimum GPA of 3.0 is required.

Minimum grade of C is required for all courses applied toward degree.

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>FIS 501</td>
<td>Foundations of Criminalistics</td>
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<tr>
<td>FIS 502</td>
<td>Forensic Laboratory Management</td>
<td>3</td>
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<td>FIS 602</td>
<td>Forensic Informatics</td>
<td>3</td>
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<td>FIS 614</td>
<td>Trace Evidence Examination</td>
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<tr>
<td>FIS 620</td>
<td>Forensic Casework Practicum</td>
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<tr>
<td>FIS 632</td>
<td>Advanced Forensic Biology</td>
<td>3</td>
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<td>FIS 660</td>
<td>Advanced Forensic Chemistry</td>
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<td>FIS 696</td>
<td>Graduate Seminar</td>
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<td>FIS 697</td>
<td>Research</td>
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<td>STAT 516</td>
<td>Forensic Statistics</td>
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<td>Approved Elective Courses *</td>
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<tr>
<td>Thesis Proposal</td>
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<tr>
<td>Thesis Defense</td>
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<td>Total Hours</td>
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* Approved Electives can include any 400 level Biology, Chemistry, or Forensic and Investigative Science course as well as FIS 604, FIS 610, FIS 615 or any 700 level Pharmacy course.

Doctor of Philosophy

MAJOR REQUIREMENTS

Minimum grade of B- in all courses

Required Core Courses

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tr>
<td>FIS 701</td>
<td>Advanced Criminalistics</td>
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<tr>
<td>FIS 702</td>
<td>Advanced Forensic Science</td>
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<tr>
<td>FIS 703</td>
<td>Research Design in Forensic Science</td>
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<td>FIS 796</td>
<td>Graduate Seminar</td>
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<tr>
<td>FIS 797</td>
<td>Research</td>
<td>15</td>
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</tbody>
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Comprehensive Oral Examination

Dissertation Proposal

Dissertation
Note: Each student must take at least two colloquium courses, one of which must be outside his/her research area. These colloquium courses are modeled after the tutorials offered at Oxford College, where the student works directly with the faculty member exploring a certain topic in greater depth. Each student will take a tutorial colloquium under the direction of his/her advisor and one from another faculty member who is a member of the dissertation committee.

The PhD program requires the completion of the courses listed above, including at least 15 hours of PhD level research. Each student must earn a cumulative GPA of 3.0 or better with no grade less than a C- in any course.

Major Learning Goals

FORENSIC AND INVESTIGATIVE SCIENCE

1. Develop and understanding of the areas of knowledge that are essential to forensic science.
2. Acquire skills and expertise in the application of basic forensic science concepts and of specialty knowledge to problem solving.
3. Ensure the student is oriented in professional values, concepts, and ethics.
4. Demonstrate integration of knowledge and skills through independent research.
5. Educate and prepare fundamentally sound criminalists.

Academic Standards

During graduate study, a minimum grade point average of 3.0 must be maintained in all required courses. A student who fails to maintain the required average at the completion of any semester will be placed on probationary status and allowed one academic year (two semesters) to attain the required average. If unsuccessful, the student will be dismissed from the graduate program. Students must earn a C or better in all required courses and a student can attempt (enroll) in an FIS graduate course a maximum of two times. Please note that this maximum applies to student enrollment at the end of a respective semester’s registration deadline. In other words, if a student drops a course after the first week of school the dropped course still accrues an attempt. Any student that enrolls in a required FIS course twice, and earns less than a C in the best attempt will be dismissed from the program.

Thesis Research

All students should identify a faculty mentor and research topic as soon as possible. In order to register for FIS 697 Research, the student must have successfully completed his or her thesis proposal defense. A student cannot register for research hours until the proposal has been successfully defended and a Plan of Study Form is completed and signed by all committee members. The Plan of Study form must be submitted to the Graduate Studies Coordinator within 24 hours of the proposal defense.

Each student is responsible to ensure that, with the assistance of the Graduate Studies Coordinator, his or her committee is correctly constituted. Upon successful completion of the research, the candidate will present his or her results in a thesis and at the appropriate time defend the work in a final oral examination according to the rules of the College and University.

Pathways to Ph.D. Program

Pathway to the PhD via the Department’s MS

Students who have completed the MS at WVU must formally apply for admission to the PhD program.

Pathways to the PhD beside that of the Department’s MS

Students who have completed an MS at another institution can enter the PhD program; their course work will be evaluated against that of WVU’s program and each student will be appraised of any course deficiencies that need to be completed as part of his/her course of study under the PhD program.

Academic standards are similar for the MS and Ph.D. program. Thesis research is different in that students are encouraged to use the manuscript model for preparing the results of their research, which consists of a series of interrelated chapters/papers on the topic. The quality and contribution of each chapter/paper should be that of an article published in a peer-reviewed scholarly journal. Some chapters/papers may actually be published in advance of the final dissertation. In fact, this latter approach is generally preferable because the chapter/paper in question will already have gone through peer review by experts outside the institution. The form for the dissertation, should include 1) an introductory chapter that clarifies the theme of the dissertation, 2) a number of interrelated papers, and 3) a concluding chapter that synthesizes and integrates the papers and proposes ideas for future work.
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 593A. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

FIS 602. Forensic Informatics. 3 Hours.
This course will cover data management in forensic laboratories (procedural and scientific). Topics such as quality, legal environment, laboratory information systems, and forensic intelligence will be developed. This course includes a laboratory component.

FIS 604. Forensic Fingerprint Examination. 3 Hours.
This course presents the fundamental and advanced aspects of fingerprint comparisons using ACE-V methodology. Specific topics such as Daubert requirements, friction ridge identification; poroscopy, palm prints will be covered. This course includes a laboratory component.

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 614. Trace Evidence Examination. 3 Hours.
PR: CHEM 314 or FIS 314. This course will develop the theories of transfer (such as hairs, fibers, paints, gunshot residues and glass). Topics such as microscopy, spectroscopy, and chromatography will be applied. This course includes a laboratory component.

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 693A. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

FIS 695. Independent Study. 1-6 Hours.
Faculty Supervised study of topics not available through regular class offerings.

FIS 696. Graduate Seminar. 1 Hour.
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. 1-15 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 792A-B. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

FIS 796. Graduate Seminar. 1 Hour.
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. 1-15 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation.

FIS 799. Graduate Colloquium. 1-6 Hours.
PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is P/F; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.