Forensic and Investigative Science

Degree Offered

• Bachelor of Science in Forensic and Investigative Science
• Bachelor of Science in Forensic Chemistry

Areas of Emphasis (within BS in Forensic and Investigative Science)

• Forensic Biology
• Forensic Examiner

Nature of Program

The Department of Forensic and Investigative Science (FIS) offers a bachelor of science degree in two major areas: Forensic and Investigative Science and Forensic Chemistry. Within the Forensic and Investigative Science degree, students can select an emphasis in Forensic Biology or Forensic Examiner. Both of these majors provide students with a strong background in the fundamental science and applied practice associated with forensic science. Within the FIS major, there are two areas of emphasis, forensic biology and forensic examiner, which allow further professional specialization. The program is accredited by the Forensic Education Programs Accreditation Commission (http://fepac-edu.org) (FEPAC).

Because of the unique nature of the profession of forensic science, students are forewarned that a record of criminal, unethical, or other socially unacceptable behavior (such as illicit drug use or alcohol offenses) could negatively affect their ability to pass a background check, which may in turn make it difficult or impossible and complete the degree. Department guidelines are available from the department adviser.

Students who earn a degree in the Eberly College of Arts and Sciences must complete the University requirements, the College requirements for their specific degree program, and their major requirements.

Minors

All students have the possibility of earning one or more minors; click the following for a list of all available minors and their requirements (http://catalog.wvu.edu/undergraduate/minors). Please note that students may not earn a minor in their major field.

Certificate of Global Engagement

Students in the Eberly College, regardless of their major, can earn a Certificate of Global Engagement. Completion of the Certificate demonstrates the student’s knowledge of diverse cultures, as well as the ability to communicate and interact effectively with people of different cultural backgrounds. Students will be required to apply their knowledge of contemporary issues and global social contexts to their course work and their broader citizenship. For details regarding Certificate requirements, please visit the Eberly College page (http://catalog.wvu.edu/undergraduate/eberlycollegeofartsandsciences/#otherdegreestext).

FACULTY

CHAIR
• Suzanne Bell - PhD (New Mexico State University)
  Forensic Chemistry

PROFESSOR
• Glen Jackson - PhD (West Virginia University)
  Ming Hsieh Distinguished Professor, Forensic Chemistry

ASSOCIATE PROFESSORS
• Keith Morris - PhD (University of Port Elizabeth)
  Ming Hsieh Distinguished Professor, Impression Evidence, Evidence Interpretation

ASSISTANT PROFESSORS
• Luis Arroyo - PhD (Florida International University)
  Toxicology, Environmental Forensics
• Rachel Mohr - PhD (Texas A&M University)
  Undergraduate Coordinator, Forensic Entomology
• Tina Moroose - MS (Marshall University)
  Graduate Studies Coordinator, Forensic Biology
• Robert O’Brien - MS (St. Joseph College)
  Ballistics, Trace Evidence
• Jacqueline Speir - PhD (Rochester Institute of Technology)
  Forensic Informatics
• Tatiana Trejos - PhD (Florida International University)
  Trace Evidence, Elemental Analysis
• Casper Venter - MS (North West University)
  Facilities Coordinator, Forensic Drug Chemistry

INSTRUCTORS
• Kelly Ayers - MS (West Virginia University)
  Continuing Forensic Education, Death Investigation
• Andrea Bebell - PhD (West Virginia University)
  First Year Advising Specialist
• Robin Bowen - MA (West Virginia University)
  Ethics, Evidence Interpretation, Minor Coordinator

Admission Requirements
• First time students who qualify for placement in CHEM 110A or higher will be admitted directly into the major. Directly admitted students will be advised by FIS advisors and are eligible to participate in the Living Learning Community and other departmentally-sponsored first-year programs.
• Students who wish to transfer from another WVU major must have completed CHEM 115 or higher and must have an overall GPA of at least 2.5.
• Students wishing to transfer from outside of WVU must have completed CHEM 115 or higher, and have an incoming overall GPA of at least 2.5

Benchmark Expectations
During their first four semesters, students are expected to complete their foundational biology, chemistry, math, and physics courses. These fundamentals must be completed prior to taking upper level FIS courses. Many of these courses will satisfy the GEF 1, 2, 3, 4, and 8 requirements, as well as the College B.S. requirements. Students interested in the forensic chemistry major are strongly encouraged to take the CHEM 117/CHEM 118 and PHYS 111/PHYS 112 series if they qualify.

Students must make acceptable progress to remain in the FIS major. Acceptable progress for the Forensic and Investigative Science major is defined as the following:
• By the start of the third regular semester (fall or spring) in the major students must be enrolled in CHEM 116 and maintain an overall GPA of 2.5

• By the end of the fifth regular semester, typically the fall of their junior year, students must have fulfilled the following requirements with a C or better. They also must maintain an overall GPA of 2.5, and declared an area of emphasis (if in the FIS major). If this benchmark is met, they will be permitted to continue into FIS 300 and 400 level courses. Students are forewarned that deviation from the plan of study may make it difficult or impossible to meet this benchmark.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 115</td>
<td>Principles of Biology</td>
<td>4</td>
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<tr>
<td>BIOL 117</td>
<td>Introductory Physiology</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 115</td>
<td>Fundamentals of Chemistry</td>
<td>4</td>
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<tr>
<td>CHEM 116</td>
<td>Fundamentals of Chemistry</td>
<td>4</td>
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<tr>
<td>CHEM 233</td>
<td>Organic Chemistry</td>
<td>4</td>
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<tr>
<td>&amp; CHEM 235</td>
<td>Organic Chemistry Laboratory</td>
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<tr>
<td>CHEM 234</td>
<td>Organic Chemistry</td>
<td>4</td>
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<tr>
<td>&amp; CHEM 236</td>
<td>Organic Chemistry Laboratory</td>
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<tr>
<td>MATH 155</td>
<td>Calculus 1</td>
<td>4</td>
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<tr>
<td>or MATH 153</td>
<td>Calculus 1a with Precalculus</td>
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<td>&amp; MATH 154</td>
<td>Calculus 1b with Precalculus</td>
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<tr>
<td>MATH 156</td>
<td>Calculus 2</td>
<td>4</td>
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<tr>
<td>PHYS 101</td>
<td>Introductory Physics</td>
<td>4</td>
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<tr>
<td>or PHYS 111</td>
<td>General Physics</td>
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<td>PHYS 102</td>
<td>Introductory Physics</td>
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• Beyond the fifth semester, students must maintain an overall GPA of 2.5 in order to remain advised in the department.

All majors must meet with a FIS advisor each semester. Students who do not meet their benchmarks may be removed from the major, but may be readmitted once they complete the fifth semester requirements.

**Major Learning Outcomes**

**FORENSIC AND INVESTIGATIVE SCIENCE**

Upon successful completion of the B.S. degree, Forensic and Investigative Science majors will be able to:

1. Demonstrate the ability to take data generated during a forensic investigation and prepare it for trial.
2. Demonstrate competency in the collection, processing, analyses, and evaluation of evidence.
3. Develop a portfolio of evidence (Resume, portfolio file, course work activities notes, etc.) detailing activities, accomplishments, certification and relevant learning experiences that will allow the student to stand out in a competitive forensic job market.
4. Demonstrate application of acquired skills, knowledge, and capabilities in professional environments (e.g. internships, professional meetings, interviews, graduate school, etc.)

**MINOR CODE - U123**

Any student admitted to a degree program at West Virginia University may complete a minor in Forensic & Investigative Science.

**COURSE REQUIREMENTS:**

A student must earn a C- or better in each course counted toward the minor.

<table>
<thead>
<tr>
<th><strong>Core Courses:</strong></th>
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<tbody>
<tr>
<td>FIS 201</td>
<td>Introduction to Forensic Identification</td>
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<tr>
<td>FIS 202</td>
<td>Crime Scene Investigation Overview</td>
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<tr>
<td>FIS 485</td>
<td>Professional Ethics in Forensic Science</td>
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<tr>
<th><strong>Upper-Division Electives:</strong></th>
<th>6</th>
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<tbody>
<tr>
<td>FIS 305</td>
<td>Biological Evidence for Forensic Examiners</td>
</tr>
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<td>FIS 306</td>
<td>Expert Testimony Perspectives</td>
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<tr>
<td>FIS 330</td>
<td>Principles of Forensic Photography</td>
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<tr>
<td>FIS 380</td>
<td>Social Relations of Forensic and Law Professionals</td>
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<tr>
<td>FIS 404</td>
<td>Law and Evidence</td>
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<tr>
<td>FIS 480</td>
<td>Forensic Quality Assurance</td>
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| **Total Hours** | 15 |

**FIS 191. First-Year Seminar. 1-3 Hours.**

Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

**FIS 194. Professional Field Experience. 1-18 Hours.**

PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

**FIS 201. Introduction to Forensic Identification. 3 Hours.**

A survey course in forensic science including overview of the various scientific disciplines that handle crime scene evidence and the systematic method of evidence analysis. Students learn about the collection, preservation, and methods of analysis of biological, chemical, and physical evidence.

**FIS 202. Crime Scene Investigation Overview. 3 Hours.**

PR: FIS 201 with a minimum grade of C-. An overview of the crime scene investigation process for the non-examiner. Course topics include: safety, evidence collection, processing, and documentation. Virtual scenarios will serve as teaching aids.

**FIS 293A. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.
FIS 301. Science/Technology of Fingerprint Identification. 1-3 Hours.
PR: FIS 201. Introduces basics of fingerprint analysis and comparisons. Focuses on basis patterns used in fingerprint comparisons and classifications of each fingerprint type, including Henry, National Crime Information Center, Integrated Automated Fingerprint Identification System pattern classification codes.

FIS 302. Crime Scene Investigation 1. 3 Hours.
PR: FIS 201. An introductory course providing basic competencies required for crime scene examiners. The course will focus on developing a consistent approach to the processing of a crime scene with a major focus on recovery/processing evidence.

FIS 303. Crime Scene Investigation 1 Laboratory. 1 Hour.
PR or CONC: FIS 302; Must have declared FIS major. The laboratory extension of an introductory course in crime scene investigation, covering skills from initial scene assessment through debriefing and clean-up. Scientific and practical methods of securing, collecting and analyzing this evidence will be taught and practiced.

FIS 305. Biological Evidence for Forensic Examiners. 3 Hours.
PR: FIS 202 or FIS 302 with a minimum grade of C- in each. This is an elective course for students in the Forensic Investigative Science major and minor. The course focuses on the collection and testing of body fluids as well as death scene investigation procedures.

FIS 306. Expert Testimony Perspectives. 3 Hours.
PR: FIS 201. A comprehensive review of expert testimony that broadens perspectives of the role of the scientist in the courtroom as well as improving expert witness capabilities.

FIS 314. Introduction to Microscopy. 3 Hours.
PR: CHEM 116 and PHYS 102 or PHYS 112. Laboratory-based introduction to theory and practice of light microscopy, polarizing light microscopy, imaging, particle manipulation, comparison microscopy, and simple microscopy. Open to non-FIDP majors and pre-admits on space available basis. (3 hr. lab.).

FIS 330. Principles of Forensic Photography. 3 Hours.
PR: FIS 201. Introduces basic principles of forensic photography for the non-investigator. Includes the history of photography, theories behind photography, and techniques for photographing type of crime scenes and evidence.

FIS 335. Forensic Photography. 3 Hours.
PR: FIS 201. Students focus on the fundamentals of photography, how to handle a camera, and expose film correctly. Include unique forensic environments encountered in forensic work includes fingerprints, crime scenes, and disaster scenes.

FIS 340. Forensic Chemical Analysis. 3 Hours.
PR: CHEM 233 and CHEM 235 with a minimum grade of C- in each. Students develop critical thinking, writing and communication skills related to fundamental concepts of analytical instrumentation and its application to the forensic discipline.

FIS 341. Forensic Chemical Analysis Laboratory. 1 Hour.
PR or CONC: FIS 340 with a minimum grade of C-. Students develop laboratory skills with analytical instrumentation as applied in forensic science.

FIS 380. Social Relations of Forensic and Law Professionals. 3 Hours.
PR: FIS 201 with a minimum grade of C-. Introduction to the relationships among attorneys, experts, and law enforcement professionals: how individuals work together for the investigative process from the initial investigation to the courtroom.

FIS 386. Forensic Identification Internship. 3-6 Hours.
PR: FIS 201 and CHEM 235 and CHEM 236 and completion of one of the following sets of courses: (FIS 301 and FIS 302 and FIS 303 and FIS 335) or (FIS 340 and FIS 341) or (BIOL 432 and BIOL 434) with a minimum grade of C- in all. Supervised field or research experience in a forensic, research, or law enforcement setting. Provides students with relevant professional experience based on their forensic interest, skills, and knowledge. Develops professional and networking skills.

FIS 393A. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

FIS 401. Professional Forensic Communication. 3 Hours.
PR: ENGL 103 or (ENGL 101 and ENGL 102) and FIS 201. Familiarizes students with forensic literature, literature searching techniques, bibliographic software; and provides students with the writing and presentation skills essential to forensic professionals.

FIS 402. Crime Scene Investigation 2. 3 Hours.
PR: FIS 302. An extension of FIS 302. This course will outline procedures for collection of biological and trace evidence using scientific and practical methods of securing, collecting, analyzing this evidence, in accordance with known standards.

FIS 404. Law and Evidence. 3 Hours.
PR: FIS 201. This course presents a comprehensive review of criminal law relating to evidence in court cases and the student's ability to relate legal precedents to procedures in collecting, processing, and securing evidence used in criminal cases.

FIS 405. Latent Fingerprint. 3 Hours.
PR: FIS 301 and in the major. A course designed to teach identification techniques used in fingerprint development for processing crime scenes and evidence for latent prints, focusing on latent print development and preservation, including crime scene processing and blood prints.
FIS 406. Court Testimony. 3 Hours.
PR or CONC: FIS 404. A skills intensive course that combines in-class instruction with practical experience in the area of court testimony, legal writing presentation, and creation and presentation of exhibits in an actual court setting.

FIS 409. Blood Stain Pattern Analysis. 3 Hours.

FIS 414. Trace Evidence Examination. 3 Hours.
PR: FIS 314 and FIS 341 with a minimum grade of C- in each. Introduces students to fundamental concepts for the identification, collection, examination and interpretation of trace evidence. Students become familiar with the forensic analysis of glass, paint, tape, hairs, fibers, inks and firearm discharge residues.

FIS 416. Trace Evidence Examination Laboratory. 1 Hour.
PR: FIS 314 and PR or CONC: FIS 414 with a minimum grade of C- in each. Develops laboratory skills for forensic examination of trace evidence, including 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 435. Advanced Forensic Photography. 3 Hours.
PR: FIS 335. A more in-depth photography course for students who wish to pursue forensic photography as a possible employment option upon graduation.

FIS 450. Computational Forensics. 3 Hours.
PR: MATH 155 or consent. An introductory-level course exposing students to non-traditional and technology driven approaches to forensic analysis, with specific emphasis on forensic imaging, analytical modeling, and computer programming.

FIS 451. Arson and Explosives Analysis. 3 Hours.
PR: FIS 340 and FIS 341 and PR or CONC: FIS 452 with a minimum grade of C- in each. Examines the chemistry of combustion and the chemical analysis of ignitable liquids, explosives and post-combustion residues. The course relies heavily on instrumental methods of analysis, including various forms of chromatography and mass spectrometry. A laboratory component provides hands-on experience with interpreting data involving ignitable liquid residues and explosives.

FIS 452. Arson and Explosives Analysis Lab. 1 Hour.
PR: FIS 340 and FIS 341 and PR or CONC: FIS 451 with a minimum grade of C- in each. Develops laboratory skills related to chemical analysis of ignitable liquids, explosives and post-combustion residues. Emphasis on instrumental methods of analysis, including various forms of chromatography and mass spectrometry and extensive hands-on experience interpreting data derived from analyzing ignitable liquid residues and explosives.

FIS 461. Analysis of Seized Drugs Laboratory. 1 Hour.
PR: FIS 340 and FIS 341 and PR or CONC: FIS 461 with a minimum grade of C- in each. Develops laboratory skills applicable to the chemical analysis of seized drugs. Emphasis on instrumental methods of analysis, including various forms of chromatography and mass spectrometry, and extensive hands-on experience with the interpretation of data involving analysis of unknown seized drugs.

FIS 470. Analytical Forensic Toxicology. 3 Hours.
PR: FIS 460 and FIS 461 and PR or CONC: FIS 471 with a minimum grade of C- in each. Application of fundamental principles of mode(s) of action of different drugs, the primary mechanisms of drug administration and distribution, drug metabolism and the excretion of xenobiotics. Current and historical cases.

FIS 471. Analytical Forensic Toxicology Laboratory. 1 Hour.
PR or CONC: FIS 470 with a minimum grade of C- in each. Develops laboratory skills applicable to forensic toxicological analysis of drugs. Students practice using sample preparation strategies such as liquid-liquid extraction, solid phase extraction, derivatization, and instrumental analysis techniques for screening and confirmation via chromatography and mass spectrometry.

FIS 480. Forensic Quality Assurance. 2 Hours.
PR: FIS 201. Quality assurance in a laboratory setting to include quality control/assurance, management, and application of statistics. ASCLD-LAB and ISO accreditation and professional certification procedures.

FIS 485. Professional Ethics in Forensic Science. 3 Hours.
Foundational ethical concepts as they relate to forensic science and other associated professional cultures. Applied case-study examples are used to analyze ethical and moral boundaries of practice.

FIS 490. Teaching Practicum. 1-3 Hours.
PR: Consent. Teaching practice as a tutor or assistant.

FIS 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

FIS 492. Directed Study. 1-3 Hours.
Directed Study, reading, and/or research.

FIS 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.
FIS 494A. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

FIS 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

FIS 497. Research. 1-6 Hours.
Independent research projects.