

Forensic Science

School

School of Science, Engineering and Technology (<http://www.stmarytx.edu/set/>)

School Dean

Teresa Beam, Ph.D. (tbeam@stmarytx.edu)

Departments

Biological Sciences (<https://www.stmarytx.edu/academics/department/biology/>)

Chemistry and Biochemistry (<https://www.stmarytx.edu/academics/department/chemistry/>)

Program Director

Jennifer Harr, Ph.D. (jharr1@stmarytx.edu)

Forensic Science is an exciting field and one of the country's fastest growing job markets. Solving crime requires knowledge of biological, chemical, physiological, social and individual factors. St. Mary's program integrates biological science, social science and professional preparation so students are uniquely prepared for this innovative area of study.

Forensic science is the application of science to the law. It relies on the physical and behavioral sciences for investigating and solving crimes and examining physical trace evidence. The School's forensic science degree with a chemistry or biology option emphasizes the integration of academic preparation and real world problem solving with a focus on ethical and professional commitment.

The Bachelor of Science in Forensic Science offers two tracks that students can choose.

- Bachelor of Science in Forensic Science - Biology Option: 120 credit hours
- Bachelor of Science in Forensic Science - Chemistry Option: 120 credit hours

Students will take 30 credit hours of core Forensic Science classes, which included three credit hours of internship.

B.S. Forensic Science - Biology Track (<https://catalog.stmarytx.edu/undergraduate/majors-programs/science-engineering-technology/forensic-science/forensic-science-bs-biology-option/>)

B.S. Forensic Science - Chemistry Track (<https://catalog.stmarytx.edu/undergraduate/majors-programs/science-engineering-technology/forensic-science/forensic-science-bs-chemistry-option/>)

FSC 3301. Forensic Science Quality Assurance. 3 Semester Hours.

This course presents common sources of forensic science errors that can occur at the crime scene, within law enforcement, in the crime laboratory, and in the courtroom and media. The roles of cognitive bias, misconduct, negligence, professional incompetence, lack of technical validation, and communication barriers in compromising forensic quality assurance are addressed. Special attention is given to laboratory specific quality assurance issues and the role of accreditation/certification in ensuring the integrity of forensic evidence and its analysis. Students also discuss court decisions, legislation, and case studies directly related to the validity of admissible scientific evidence, disclosure of quality assurance incidents, and wrongful convictions due to forensic science errors. The importance of the scientific method in the development and validation of new forensic techniques is emphasized. The expected professional and personal ethics of forensic science practitioners and the common ethical dilemmas they face are also highlighted. Prerequisites: BL 1401, BL1402, CH 1401, CH 1402 OR permission of instructor. (Fall). (All courses serving as prerequisites in the School of Science, Engineering and Technology must be completed with a "C" or better in order to advance to the next sequenced course.) (Lecture 3 hours).

FSC 3330. Forensic Science Internship. 3 Semester Hours.

This course will provide an opportunity for forensic science students to participate in the complex operations of modern forensic/clinical/chemical laboratory. Students majoring in Forensic Science – Chemistry or Biology will need to complete a minimum of 160 hours. Emphasis will be placed on commonly used forensically-relevant test methods and the use of standard operating laboratory procedures. Examples of potential collaborative organizations include, but not limited to, forensic toxicology labs, clinical toxicology labs, crime scene investigations and medical examiner's facilities or an independent research laboratory. A combination of agencies may be used pending approval of the organizations and the faculty internship advisor. Prerequisites: Permission of instructor. Seniors will be given preference. (Fall, Spring, Summer).

FSC 3380. Forensic Pharmacology. 3 Semester Hours.

This course will present the basic pharmacokinetics of forensically relevant drugs, such as opioids, hallucinogens, stimulants, depressants, and cannabinoids. Students will discuss how these drugs influence behavior, illness, injury, and death as revealed by crime scene and laboratory analyses. In parallel, appropriate biological and chemical instrumentation to perform pharmacological investigations will be presented. High-profile medico-legal cases in forensic pharmacology and the legislation governing the development, distribution, and use of certain drugs will also be discussed. Prerequisites: BL 1401, BL1402, CH 1401, CH 1402, CR 3335 OR permission of instructor. (Spring Only Even Year). (All courses serving as prerequisites in the School of Science, Engineering, and Technology must be completed with a C or better in order to advance to the next sequenced course.) (Lecture 3 hours).

FSC 3401. Forensic Microscopy. 4 Semester Hours.

Microscopy enables the detection, examination, and analysis of diverse forensic evidence during criminal investigations, and proficiency with various types of microscopy is expected of forensic science practitioners. Conceptually, this course will present the dynamic role of microscopy in a medico-legal context, the optics and mechanics governing forensic microscopy, and the obligation of forensic science practitioners to perform these analyses ethically and with professional competence. Students will also critique and discuss primary research articles in the field of forensic microscopy. Practically, students will use stereo-, compound light, polarizing light, and fluorescence microscopy to analyze physical, biological, and chemical evidence as appropriate. Emerging instrumental microscopy techniques will also be discussed. Prerequisites: BL 1401, BL1402, CH 1401, CH 1402, CR 3335 OR permission of instructor. (Spring Odd Years) (All courses serving as prerequisites in the School of Science, Engineering, and Technology must be completed with a "C" or better in order to advance to the next sequenced course.) (Lecture 3 hours; Lab 4 hours). Additional fee associated with this course. See fee schedule for details at <https://www.stmarytx.edu/admission/financial-aid/tuition/>.

FSC 3442. Forensic Osteology. 4 Semester Hours.

An examination of the human skeleton as it pertains to forensic science. Topics to be covered include introductory skeletal anatomy, pathology and biology of bone, and basic forensic techniques related to skeletal remains. The laboratory section will teach identification of isolated and fragmentary skeletal elements, and recognition of human skeletal elements versus skeletal remains from non-human vertebrates. Techniques for determining approximate age, gender, stature, and identifying different types of trauma to skeletal remains will be taught. Prerequisites: BL 2330, BL 2332, & BL 2233L. (All courses serving as prerequisites in the School of Science, Engineering and Technology must be completed with a "C" or better in order to advance to the next sequenced course.) (Lecture 3 hours; Lab 4 hours) (Spring odd years).

FSC 3450. Forensic Chemistry. 4 Semester Hours.

This course will cover the major techniques and instruments used in the analysis of non-biological trace chemical evidence and pattern evidence commonly encountered at crime scenes. The techniques covered will include gas and liquid chromatography, UV-visible spectroscopy, infrared spectroscopy, and others. Impressions and physical matches will also be covered. The laboratory will focus on the hands-on use of these techniques on samples of forensic interest. Prerequisites: CH 2411, CH 2412 and FSC 3301 OR permission of instructor; All courses serving as prerequisites in the School of Science, Engineering and Technology must be completed with a "C" or better in order to advance to the next sequenced course.) (Lecture 3 hours; Lab 4 hours). Additional fee associated with this course. See fee schedule for details at <https://www.stmarytx.edu/admission/financial-aid/tuition/>.

FSC 4410. Forensic Toxicology. 4 Semester Hours.

This course will discuss the complex operations of modern forensic toxicology laboratories. It will also discuss the fundamentals of how the human body affects consumed drugs as well as how drugs affect the human body, especially as it relates to behavior and death. Emphasis will be placed on commonly observed forensically relevant drugs, such as ethanol, opioids, cannabinoids, hallucinogens, designers as well as central nervous system (CNS) stimulants and depressants. In parallel, relevant biological and chemical methodologies will be discussed and then used to perform toxicological investigations. Relevant medicolegal cases will also be discussed. Prerequisites: BL 1401, BL 1402, CH 1401, CH 1402, CR 3335 OR by permission of instructor. Additional fee associated with this course. See fee schedule for details at <https://www.stmarytx.edu/admission/financial-aid/tuition/>. (Spring even years).

FSC 4420. Forensic Biotechnology. 4 Semester Hours.

This course will cover the use of biotechnology for forensic applications. We will study the major techniques, methods, and instruments used in the analysis of biological evidence commonly encountered at crime scenes. The material will cover the underlying molecular biology techniques used in blood analysis, blood typing, DNA fingerprinting, genetic testing, and advanced sequencing technologies. We will also focus on the personal, societal, and ethical concerns that have and are expected to arise with the increased use of personal genomic information. The techniques covered will include those commonly used in forensic laboratories such as conducting presumptive tests for fluids, DNA extraction, DNA isolation, quantification of DNA, polymerase chain reactions (PCR), DNA sequencing, and analysis of STR profiling, mtDNA, and others. Additionally, we will cover the use of DNA databases for use in forensic investigation. The laboratory will focus on the hands-on use of these techniques as well as an understanding of procedures to minimize contamination, maintain accurate records, and troubleshoot. (Fall) Prerequisites: BL 1401, BL 1402 and CH 1401, CH 1402, CR 3335 permission of the instructor. (All courses serving as prerequisites in the School of Science, Engineering, and Technology must be completed with a C or better to advance to the next sequenced course.) (Lecture 3 hours; Lab 4 hours). Additional fee associated with this course. See the fee schedule for details at <https://www.stmarytx.edu/admission/financial-aid/tuition/>.