FORENSIC SCIENCE M.S.

Degree: Master of Science
https://www.towson.edu/fcsm/departments/chemistry/grad/forensic/

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Mission Statement
The mission of the Master of Science in Forensic Science Program is to provide students with a comprehensive and in-depth study of major areas of forensic science that will allow them to compete for positions in forensic science beyond the entry level.

The program is based on an application-focused curriculum that provides the student an advanced educational background and the development of laboratory skills. The program's mission is further enhanced through active forensic research, internships and collaborative learning experiences with accredited forensic laboratories.

Program Goals and Objectives
The goals and objectives of the Towson University Master of Science in Forensic Science Program is to prepare students for positions as working forensic scientists in business, industry and government careers. To meet these goals, the program combines chemistry, biology and specialized forensic science course work to provide students with advanced scientific and laboratory training in major areas of forensic science including crime scene analysis, forensic DNA analysis and trace evidence/toxicology analysis.

General Information
The Master of Science in Forensic Science program is a FEPAC-accredited program that is both molecular biology/biochemistry-based, focusing on forensic DNA analysis, or chemistry-based, focusing on toxicology, drug and trace evidence analysis. This program has the support of and benefits from a wide variety of talented faculty members from the department of Chemistry as well as forensic professionals serving as adjunct faculty. The program is rich with laboratory experience, capped with a research project, internship in a forensic laboratory or a thesis.

The program provides advanced education in the scientific and laboratory problem-solving skills necessary for success in a modern forensic laboratory. The program combines this rigorous training with exposure to the breadth of forensic science disciplines, including forensic science practice, law and ethics. The program is intended for students who are interested in working as forensic scientists in the field. The flexible degree program is also designed to meet the professional development needs of forensic scientists now employed in Maryland and the mid-Atlantic region.

The curriculum ensures that each student:

- Acquires skills and experiences in the application of basic forensic science concepts, analytical chemistry and forensic DNA knowledge to problem solving.
- Is oriented in professional values, concepts and ethics.
- Demonstrates integration of knowledge and skills through a capstone experience, such as a seminar, a research project, an internship or thesis.

Qualifications for a career and/or internship in forensic science
Prospective students should be aware that background checks, driving records, drug tests, polygraph, and medical or physical examinations similar to those required of law enforcement officers are likely to be a condition of employment and/or internships. Please refer to: NIJ Report NCJ 203099, pp. 7-10 for additional information.

Admission Requirements
- A B.S./B.A. in biological sciences, chemistry or forensic chemistry from a regionally accredited college or university is required for full admission. Students with a B.S./B.A. in a natural science with two terms in general chemistry, organic chemistry and general physics, and at least one term in general biology, analytical chemistry, statistics, biochemistry, molecular biology and genetics can be considered for admission.
- A GPA of 3.00 in previous science course work and an overall GPA of 3.00 are required for full admission. GPA calculations for admissions may be based upon the last 60 units of undergraduate and post-baccalaureate study. Students having a GPA of 2.75-2.99 may be considered for conditional admission. Full admission will be granted after students achieve a GPA of 3.00 in their first 9 graduate units taken at Towson University.
- Graduate application, application fee and official transcripts.

Application Deadline
This program admits students for the fall and spring terms only.

Priority will be given to students whose application and transcripts have been received by March 30 for fall admission and October 31 for spring admission.

Students who miss the priority deadline may contact the program director via email at mprofili@towson.edu to inquire if space is still available for the forthcoming term.

Non-immigrant International Students
Program Enrollment: F-1 and J-1 students are required to be enrolled full-time. The majority of their classes must be in-person and on campus. See the list of programs that satisfy these requirements, and contact the International Student and Scholars Office with questions.

Admission Procedures: See additional information regarding Graduate Admission policies and International Graduate Application online.

Degree Requirements
All students complete 37 units of graduate work. No more than three courses may be taken at the 500 level.

Students wishing to pursue a forensic chemistry rich program that is centered in toxicology, drug and trace analysis may do so with the
consent of the program director. This will require substitution of some of the required biology based courses with elective chemistry based courses. The number of courses and credit units will not be affected by these substitutions.

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**Elective Courses**

Students must consult with the program director prior to selecting their electives.

Select 9 units from the following:

- FRSC 622 ADVANCED SEQUENCING METHODS
- FRSC 640 CHEMISTRY OF DANGEROUS DRUGS
- FRSC 650 DNA MICROSCOPY
- FRSC 660 DEATH ANALYSIS IN FORENSIC SCIENCE
- FRSC 670 FORENSIC ANALYTICAL METHODS
- FRSC 690 FORENSIC TOXICOLOGY
- BIOL 602 MOLECULAR BIOLOGY
- BIOL 614 APPLIED BIOTECHNOLOGY
- MATH 539 BIOSTATISTICS II

Up to 6 elective units from other disciplines may be taken with permission from the FRSC director.

**Capstone Courses**

A total of 6 units from the following:

- FRSC 787 GRADUATE INTERNSHIP IN FORENSIC SCIENCE (0-6)
- FRSC 880 RESEARCH PROJECT IN FORENSIC SCIENCE (0-6)
- FRSC 897 FRSC THESIS (6)

**Total Units** 37

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1. Students will learn to apply their knowledge of analytical chemistry, molecular biology, population genetics, forensic biology, forensic DNA technology and statistics in a forensic setting.
2. Students will gain advanced skills in instrumental methods, microscopy, serology, DNA analysis, quality assurance and the ethical and legal requirements applicable to the examination of physical evidence and courtroom testimony.
3. Students will develop written and oral communication skills for presentation of analytical findings and courtroom testimony.
4. Students will be able to make a professional presentation of their research findings in a symposium/seminar format.

**Courses**

**FRSC 600 FORENSIC SCIENCE AND LAW (3)**

Study of the judicial response and requirements to uses of forensic science analysis of physical evidence in the investigation, prosecution, and defense of a crime with an emphasis on legal casework associated with rules of admissibility of evidence. A practicum involving mock trial courtroom testimony is essential part of the course. Professional ethics related to forensic science and courtroom testimony is a main component of this course.

**FRSC 601 FORENSIC MOLECULAR BIOCHEMISTRY (3)**

Overview of the principles of molecular biology and genetics as it applies to Forensic Science including; DNA metabolism, recombination and mapping, repeat of DNA sequences, statistics and significance of variation, Polymerase Chain Reaction, human identification through DNA technologies, population genetics, relationship analyses and databasing.

**FRSC 602 FORENSIC CHEMISTRY (3)**

Introduction to chemical and physical analyses used by a modern crime laboratory in the evaluation of physical evidence encountered in criminal acts. Areas of concentration will include drug analysis, toxicology, explosives analysis, arson examination, firearms and tool marks, latent prints and trace evidence. Emphasis will be placed on the value of such examinations as presented by the expert witness in criminal trial. Four hours of lecture/laboratory per week. Lab/Class fee will be assessed.

**FRSC 604 CRIME SCENE AND IMPRESSION EVIDENCE (3)**

The interdisciplinary aspects of forensic science are taught through a variety of lectures and practical exercises including crime scene analysis, documentation and processing, evidence recovery procedures, latent print development and examination, firearms and tool marks examination, impression evidence examination, and trace and blood evidence recognition and collection. Ethical and legal requirements associated with crime scene processing will be taught from chain of custody through expert court testimony. Prerequisite: program admission.

**FRSC 610 FORENSIC SEROLOGY (3)**

Instruction and laboratory practice in identifying body fluids and body fluid stains using various biochemical, instrumental, microscopic and electrophoretic methods to determine their possible origin and species prior for forensic DNA analysis. Blood spatter pattern recognition will be described and used in determining the most probative samples for study at the crime scene and on evidence samples to undergo analysis. Core course to be taken first year in program. Intended for MSFS students only. Four lecture/lab hours per week. Lab/Class fee will be assessed.

**FRSC 620 DNA TECHNOLOGIES (3)**

Instruction and laboratory practice in identifying body fluids and body fluid stains as to their source using state of the art DNA technology. Methods include extraction of DNA from forensic biological samples, quantification of the extracted DNA, molecular amplification of the extracted DNA and visualization of short segments known as short tandem repeats or sttr’s. Four lecture/lab hours per week. Prerequisite: FRSC 610. Lab/Class fee will be assessed.
FRSC 621 ADVANCED DNA TECHNOLOGIES (3)
Instruction and laboratory practice in identifying body fluid stains as to their source using current state of the art DNA technology. Instrumental methods of analysis will be emphasized; interpretation of DNA data using appropriate software and the statistical analysis; report writing and oral presentations in a mock trial. Four lecture/laboratory hours per week. Prerequisite: FRSC 620. Lab/Class fee will be assessed.

FRSC 622 ADVANCED SEQUENCING METHODS (3)
Theory and application of DNA sequencing technology including Sanger sequencing, pyrosequencing, and massively parallel sequencing and their uses in forensic DNA analysis. Five lecture/laboratory hours. Prerequisite: FRSC 621.

FRSC 640 CHEMISTRY OF DANGEROUS DRUGS (3)
A study of the chemistry, methods of detection and analysis of narcotics, depressants, stimulants and hallucinogens. Also, the influence of physicochemical properties upon the pharmacological effects of drug-receptor interactions. Historical, forensic and socio-economic implications associated with drug abuse will also be reviewed. Three lecture/lab hours. Lab/Class fee will be assessed.

FRSC 650 FORENSIC MICROSCOPY (3)
Instruction and laboratory practice in the methods of collecting, handling, preparing, identifying and comparing items of trace and biological evidence and utilization of the stereomicroscope, microspectrophotometer, scanning electron microscope, polarizing microscope, compound microscope, fluorescent microscope, hot stage microscope and comparision microscope. Advanced elective intended for MSFS students. Open to MS Forensic Science students only. Prerequisite: FRSC 621.

FRSC 660 DEATH ANALYSIS IN FORENSIC SCIENCE (3)
The forensic examination of the deceased through a multifaceted approach of different forensic specialties. Topics include identifying the deceased, determining the cause and manner of death, and establishing the post mortem interval. Advanced elective for MSFS students.

FRSC 670 FORENSIC ANALYTICAL METHODS (3)
Analytical instrumentation used for analysis of drugs, arson, explosives, and trace evidence. Laboratory work includes sample preparation, handling, analysis and data interpretation for samples from simulated crime scenes. Use and conformity to standard protocols, quality assurance, and quality control methods, statistical methods for calibration and analysis of data. Four laboratory/lecture hours. Lab/Class fee will be assessed.

FRSC 690 FORENSIC TOXICOLOGY (3)
Provides in-depth knowledge of forensic, analytical chemistry and toxicology principles as they pertain to the commonly encountered abused and toxic substances. Includes modules in various topics, i.e. alcohol and volatiles, legal and illegal drug effects on human performance and postmortem toxicology. A series of case studies will be used to reinforce concepts and to combine individual topics covered in each module. Prerequisite: FRSC 602 may be taken concurrently.

FRSC 695 SPECIAL TOPICS IN FORENSIC SCIENCE (3)
In-depth study in a selected area pertaining to forensic science. Can be taken up to four times for a total of 12 units provided a different topic is taken each time.

FRSC 787 GRADUATE INTERNSHIP IN FORENSIC SCIENCE (3)
Supervised laboratory experience relating forensic theory and practice. The internship will be carried out in a commercial, city, county or federal laboratory. The total number of hours spent at the internship site will be a minimum of 160 but may be greater if required by the internship site. Students may be required to submit to polygraph, background checks, physical exams and drug screens by the internship site; any funding required by the internship site for this is the responsibility of the student. Prerequisites: program admission; 12 units of coursework in the major; and a minimum 3.0 cumulative GPA.

FRSC 797 GRADUATE SEMINAR FOR FORENSIC SCIENCE (1)
Student reports and discussion dealing with forensic research. Students are also expected to attend seminars pertaining to forensic and other natural sciences given on the university campus throughout their program. This course is for students enrolled in MS Forensic Science Program. Prerequisites: enrollment in Forensic Science graduate program and Permission of the Program Director.

FRSC 880 RESEARCH PROJECT IN FORENSIC SCIENCE (3)
Laboratory research of a matter of forensic significance under the direction of a 3 member research committee headed by a faculty mentor at Towson University. Before beginning the research project, students must present their proposals for approval by the faculty mentor and research committee. The project can be carried out on campus, or at a cooperating forensic laboratory under the joint supervision of a faculty member and a cooperating forensic scientist. Substantial written report and oral presentation required. The oral presentation and defense of the project will be evaluated by the students research committee and graded by the faculty mentor. This course can only be taken by Forensic Science Masters students. A special permit is required to register for this course. Prerequisites: 18 units of graduate forensic science courses. Lab/Class fee will be assessed.

FRSC 897 FRSC THESIS (6)
Original investigation to be completed under the supervision of one or more faculty members. Credit is granted after thesis is accepted. Prerequisite: Permit from department.

FRSC 898 FRSC THESIS (3)
The previous course, FRSC 897, taken over two consecutive semesters.

FRSC 899 THESIS CONTINUUM (1)
Continuum of graduate thesis research project for students who did not complete the project work during the regular project course registration. Prerequisite: FRSC 897.