FAYETTEVILLE STATE UNIVERSITY

College of Basic and Applied Sciences
Department of Natural Sciences

Bachelor of Science in Forensic Science Program

CONCENTRATIONS: FORENSIC BIOLOGY AND FORENSIC CHEMISTRY

PROGRAM GUIDE

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DEPARTMENT OF NATURAL SCIENCES

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Program Guide

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INTRODUCTION

The study of Forensic Science engages students in the application of scientific principles and methods for the evaluation of evidence. The mission of the Bachelor of Science degree program in Forensic Science is to produce technically skilled and educated graduates who have a basic foundation in scientific and laboratory problem solving skills necessary for success in a modern crime laboratory, and who will contribute to the forensic science community. Students will receive preparation in areas such as DNA analysis, forensic biology, forensic chemistry, and toxicology. The program will also equip students with the knowledge and skills needed to prepare reports documenting their findings and laboratory techniques used, and to provide expert witness testimony on specific laboratory findings. Upon completion of the Forensic Science program, graduates will be prepared to function as forensic scientists and specialists, or for advanced study in forensic science, biomedical research, medicine, and law.

Forensic Science applies scientific methodologies to the criminal justice system. The field of forensic science has received extensive exposure in recent years and is now regarded as highly respected discipline among scientists and criminalists. Forensic science encompasses a wide array of disciplines including criminology, pathology, toxicology, etc. The educational background of professionals in this field is embedded heavily in the natural and behavioral sciences such as chemistry, biology, physics, sociology and criminal justice. An undergraduate degree in forensic science can emphasize forensic analysis from a biological or chemical approach. Forensic Biology puts emphasis on the measurements and procedures used in the examination of biological evidence and the importance of the information derived from the interpretations. In contrast, Forensic Chemistry primarily involves analysis of chemical samples as it relates to chemical purity and substance identification.

Successful completion of either concentration will lead to the granting of a Bachelor of Science degree in Forensic Science. Graduates of this program will be qualified to obtain entry level positions in the selected areas of major, or for entry into graduate or professional schools.

EDUCATIONAL OBJECTIVES

The educational objectives of the Bachelor of Science degree program in Forensic Science are consistent with the mission of Fayetteville State University and the accreditation standards of the Forensic Science Education Programs Accreditation Commission (FEPAC) of the American Academy of Forensic Sciences (www.aafs.org). Students should be able to:

a.) Synthesize empirical and theoretical knowledge from the natural sciences core, specialty core, forensic core, criminal justice, and laboratory science courses as well as the University College core courses in social sciences,

mathematics, English, and the humanities to effectively provide service to the forensic science community;

b.) Demonstrate competency in performing laboratory analysis of biological and physical samples, crime scene investigation, and evidence documentation;
c.) Demonstrate the acquisition of skills and experiences in the application of basic forensic science concepts and of specialty knowledge to problem solving;
d.) Exhibit an orientation in professional values and concepts of ethics appropriate to the area of forensic science and law;
e.) Demonstrate the integration of knowledge and skills through a capstone experience;
f.) Exhibit excellent written and oral communication skills;
g.) Demonstrate knowledge of and appreciation for the issues specific to forensic science.

These learning objectives will be measured through the successful completion of coursework, laboratory experiences, exams, papers and an internship as determined by the faculty responsible for teaching in the degree program.

MISSION STATEMENT OF THE FORENSIC SCIENCE PROGRAM

The mission of the Forensic Science Program at Fayetteville State University (FSU) is consistent with the mission and philosophy of FSU. The program will provide students with a quality education through a basic liberal-arts foundation and specialized professional training in Forensic Science. The Forensic Science Program educates and prepares students with the ability to provide quality analysis of scientific evidence through various scientific methods and principles applicable to criminal justice and the law. The B.S. Degree in Forensic Science provides students with an interdisciplinary course of study that prepares them for careers as forensic scientists, chemists, or biological scientists. In addition, the Forensic Science program serves as a solid foundation for the matriculation into graduate or professional schools.

ORGANIZATION AND STRUCTURE OF THE CURRICULUM

The Bachelor of Science in Forensic Science will consist of two concentrations: Forensic Biology and Forensic Chemistry. Each concentration will require 124 semester credit hours of course work. There will be 45 credits in the University College Core which provides a strong liberal arts foundation, 32 hours in Natural Sciences core courses, 19 hours in concentration courses (forensic biology concentration or forensic chemistry concentration), and 28 hours in forensic science core and forensic laboratory science courses.

PROGRAM LOCATION AND FACILITIES

The Forensic Science program will be housed in Lyons Science Complex as part of the Department of Natural Sciences. Current facilities are scheduled for renovation and expansion. These plans include space to accommodate increased enrollment generated by the addition of the forensic science program and additional new programs that are

currently being developed. Additional space will be provided with the construction of the 56,000 square foot Lyons Science Annex scheduled for completion in 2006.

PROGRAM ADMISSIONS REQUIREMENTS

Admission requirements for the Forensic Science program

Admission to the Forensic Science is based upon the following

a. Minimum university college core of 18 hours (total university required core hours of 45 credits).
b. Minimum of "C" in the science and mathematic core listed below with a maximum of two total repeated courses.

   Forensic Biology/Forensic Chemistry

   Chem 140/160 (8 credits)
   Math 129/130 (6 credits)
   Chem 221/Chem 222 (9 credits)
   Phys 111/112 (8 credits)
   Introduction to Forensic Science (3 credits)
   Biol 150 (4 credits) (Biology only)
   Zool 110 (4 credits) (Biology only)
   Biol 200 (4 credits) (Biology only)
   Math 142 (4 credits) (Chemistry only)
   Math 242 (4 credits) (Chemistry only)
   Chem 210 (5 credits) (Chemistry only)

c. Cumulative GPA of 2.5 (Overall GPA of 2.5 calculated on all transferable college courses attempted at all accredited institutions of higher education as used by FSU).
d. Students will be required to **apply in writing for admission** into the Forensic Science program; approval will be by the faculty. As part of the admission process, the students will be required to pass a background check and a review process needed for employment in a traditional law-enforcement position. Such requirements are necessary to place students in outside internship programs. Students unable to meet such stringent qualifications will not be admitted into the Forensic Science Program. Applications must be submitted by March 1 of the sophomore year for admission commencing during the fall semester of the junior year.

Documents to be submitted for admission

All students applying for admission must submit the following information for permanent records:

a. Official transcripts of all previous academic work to include credit hours achieved in lecture and laboratory courses.
b. Official documentation of graduation from an accredited high school, high-school equivalent, or earned credits from a post-secondary institution.
c. Application for admission to the Forensic Science Program.

d. Personal statement.
e. Three letters of recommendation.

A formal interview with the Forensic Science faculty is required.

TRANSFER CREDIT

A maximum of 60 hours of transfer credits will be accepted towards the Forensic Science degree. No credit will be accepted for science and mathematics courses taken more than ten (10) years earlier.

ACADEMIC POLICIES AND PROCEDURES

Part-time students

The BSFS program welcomes part-time students to the program. Course schedules will be developed by students following consultation with the Program Director.

Grade Requirements

The minimum level of student competency in the Forensic Science program is established by the achievement of a grade of C or better in all required courses (Natural Science core, concentration, and Forensic Science core). A student must maintain a cumulative GPA of at least 2.0 to be in good academic standing.

Graduation Requirements

To qualify for graduation with a Bachelor of Science in Forensic Science, a student must successfully meet the following requirements:

- Successful completion of all courses outlined in the appropriate 4-year degree plan
- Cumulative GPA of 2.0 or higher in all majors courses
- Overall GPA of 2.0 or higher
- Final exit examination

DEGREE REQUIREMENTS.

1. **Total hours required. 124**

2. **Comprehensive exams**: Final exit examination will be administered at the completion of the degree program. Students will be required to obtain a grade of C or better to qualify for graduation.

3. **Language requirements.** All students will be required to complete six credits of a foreign language of choice. In addition, all students will be required to take a three-credit introductory

computer science course as well as a three-credit hour statistics course.

4. **Any time limits for completion.** Students will be expected to complete the degree requirements within six years of continuous enrollment from the date of their initial enrollment at the university.

CURRICULUM

1. **Existing Required Courses for Forensic Biology**

Courses are numbered based on course level: 100-, 200-, 300- or 400-level courses. Course in the upper division of the major are numbered 300 or 400. Course descriptions include credit hours, lecture hours and lab hours per week.

University College Core Curriculum, 45 Credits

Freshman Seminar/University Studies, 2 credits
UNIV 101 Freshman Seminar I
UNIV 102 Freshman Seminar II

Critical Thinking, 3 credits
PHIL 110 Critical Thinking

English, 6 credits
ENGL 110 English Comp. I
ENGL 120 English Comp. II

Speech, 3 credits
SPEE 200 Intro to Speech

Physical Education/Health Education, 2 credits
HEED 112 Health/Wellness (2 credits)
Two of the following (1 credit)
PEDU 100, 101, 102, 103, 106, 107, 110, 111, 112, 120, 122, 130, 132, 140, 141

Math, 6 credits
MATH 129 Pre-Calculus I
MATH 130 Pre-Calculus II

Natural Sciences, 8 credits

Forensic Biology
BIOL 150 Principles of Biology

ZOOL 110 General Zoology

Forensic Chemistry

CHEM 140 General Chemistry I
CHEM 160 General Chemistry II

History/Social Sciences, 3 credits

CRJC 200 Intro to Criminal Justice System

Humanities/Fine Arts, 3 credits

University College Restricted Electives, 9 credits

1. 100 or 200-level foreign language sequence, 6 credits
2. 3 credits from any 100 or 200 level course: **CSC 100 (3 credits)**

Forensic Science Program Requirements, 79 credits

I. Natural Sciences (32 credits)

Forensic Biology

BIOL 150	Principles of Biology	(4)***
CHEM 140	General Chem I	(4)
CHEM 160	General Chem II	(4)
CHEM 221	Organic Chem I	(4)
CHEM 222	Organic Chem II	(5)
MATH 142	Calculus-Anal. Geometry	(4)
STAT 202	Basic Probability/Statistics	(3)
PHYS 111	Gen. Physics I	(4)
PHYS 112	Gen. Physics II	(4)
Can substitute for Gen. Physics		
PHYS 121	College Physics I	(4)
PHYS 122	College Physics II	(4)

*****University college requirement (credits counted in the Univ. coll. total, not in the Nat Sci total; also must take Zool 110 as a Univ. college requirement.)**

Forensic Chemistry

CHEM 140	General Chem I	(4) ***
CHEM 160	General Chem II	(4) ***
CHEM 221	Organic Chem I	(4)
CHEM 222	Organic Chem II	(5)
MATH 142	Calculus-Anal. Geometry I	(4)
MATH 241	Calculus-Anal. Geometry II	(4)
MATH 242	Calculus-Anal. Geometry III	(4)
STAT 202	Basic Probability/Statistics	(3)
PHYS 121	College Physics I	(4)
PHYS 122	College Physics II	(4)

*****University college requirement (credits counted in the Univ. coll. total, not in the Nat Sci total)**

II. Biology Concentration Courses (19 credits)

BIOL 200	Cellular Biology	(4)
ZOOL 410	Genetics	(3)
BICH 411	Biochemistry	(3)
BIOL 330	Microbiology/Immunology	(3)
FORS/BIOL 325	Molecular Biology	(3)
FORS/BIOL 431	Population Genetics	(3)

III. Chemistry Concentration Courses (19 credits)

CHEM 210	Analytical Chemistry	(5)
CHEM 310	Instrumental Analysis	(4)
CHEM 321	Thermodynamics and Equilibrium	(3)
CHEM 322	Quantum mechanics/spectroscopy	(3)
CHEM 330	Principles of Inorganic Chemistry	(3)
CHEM 410	Seminar in Chemical Literature	(1)

IV. Forensic Science Courses (28 credits)

FORS 200	Intro to Forensic Science	(3)
FORS 440	Internship (at SBI, FBI, etc.)	(4)
FORS 300	Forensic Professional Practice	(3)
FORS 410	Technical Writing in Forensic Science	(3)
FORS 400	Forensic Microscopy	(4)
FORS 420	Analytical Methods in Forensic Science I	(4)
FORS 430	Analytical Methods in For. Sci. II (Chemistry only)	(4)
FORS 450	DNA Analysis in Forensic Science (Biology only)	(4)
CRJC 202	Legal Aspects of Criminal Justice	(3)

All new course titles are in BOLD.

Bachelor of Science in Forensic Science, 124 Credits
Biology Concentration

See Department of Natural Sciences for more information. Courses must be selected in consultation with an advisor.

Freshman Year

First Semester				Second Semester			
CHEM	140	General Chemistry I	4	CHEM	160	General Chemistry II	4
UNIV	101	Freshman Seminar I[1]	1	UNIV	102	Freshman Seminar II[1]	1
ENGL	110	English Composition I[2]	3	ENGL	120	English Composition II	3
MATH	129	Pre-Calculus I[3]	3	MATH	130	Pre-Calculus II[3]	3
BIOL	150	Principles of Biology[4]	4	ZOOL	110	General Zoology	4
PHIL	110	Critical Thinking[6]	3			PEDU/HEED Elective[5]	1
			18			PEDU/HEED Elective[5]	1
							17

[1]UNIV 101-102 required of all first-time freshmen; UNIV 110, University Studies (2), required of Transfer Students with fewer than 30 credits.
[2]ENGL 108, Grammar and Usage, may be required, based on placement criteria.
[3]MATH 129 and MATH 130 are required, but profile examination may indicate that MATH 121 must be completed as a prerequisite.
[4]A profile examination score may indicate that BIOL 110 must be completed as a pre-requisite to BIOl 150
[5]Physical Education/Health Requirement may be fulfilled by completing HEED 112, Health and Wellness (2) OR two PEDU courses selected from PEDU 100, 101, 102, 103, 106, 107, 110, 111, 112, 120, 121, 122, 130, 132, 140, 141.
[6]PHIL 110, Critical Thinking, not required of Transfer Students with 60 or more transfer credits.

Sophomore Year

First Semester				Second Semester			
FORS	**200**	**Introduction to Forensic Science**	**3**	STAT	202	Basic Probability and Statistics	3
BIOL	200	Cellular Biology	4			Humanities/Fine Arts Elective[1]	3
CHEM	221	Organic Chemistry I	4	CHEM	222	Organic Chemistry II	5
PHYS	111	Gen. Physics I[2]	4	PHYS	112	Gen. Physics II[2]	4
			15				15

[1]Humanities/Fine Arts Elective: Select one course from ART 210, ART 211, ENGL 211, ENGL 212, ENGL 220, ENGL 223, ENGL 240, HUMN 211, HUMN 212, MUSI 210, MUSI 260, PHIL 210, PHIL 212, PHIL 220, THEA 203.
[2]PHYS 121 and PHYS 122 may be substituted for Phys 111 and 112.

Junior Year

First Semester				Second Semester			
FORS	**300**	**Forensic Professional Practice**	**3**	MATH	142	Calculus-Ana. Geometry	4
ZOOL	410	Genetics	3	CRJC	202	Legal Aspects of Criminal Justice	3
		Foreign Language[1]	3			Foreign Language[1]	3
CRJC	200	Intro. to Criminal Justice System[2]	3	CSC	100	Introduction to Computers[3]	3
SPEE	200	Introduction to Speech	3	**FORS/BIOL**	**325**	**Molecular Biology**	3
			15				16

[1]Fulfills University College Restricted Elective Requirement.
[2]Fulfills University College History/Social Science requirement.
[3]Fulfills University College Restricted Elective Requirement.

Senior Year

First Semester				Second Semester			
FORS	**400**	**Forensic Microscopy**	**4**	**FORS**	**440**	**Internship[1]**	4
FORS/BIOL	**431**	**Population Genetics**	**3**	BIOL	330	Microbiology/Immunology	3
FORS	**410**	**Technical Writing in For. Science**	**3**	BICH	411	Biochemistry	3
FORS	**420**	**Anal. Methods in For. Science I**	**4**	**FORS**	**450**	**DNA Analysis in For. Sci**	**4**
			14				14

BOLD: Courses to be developed
[1]At SBI, etc. during the semester.

Bachelor of Science in Forensic Science, 124 Credits
Chemistry Concentration

See Department of Natural Sciences for more information. Courses must be selected in consultation with an advisor.

Freshman Year

First Semester				Second Semester			
UNIV	101	Freshman Seminar I[1]	1	UNIV	102	Freshman Seminar II[1]	1
ENGL	110	English Composition I[2]	3	ENGL	120	English Composition II	3
MATH	129	Pre-Calculus I[3]	3	MATH	130	Pre-Calculus II[3]	3
CHEM	140	General Chemistry I	4	CHEM	160	General Chemistry II	4
		Humanities/Fine Arts Elective[4]	3	CSC	100	Introduction to Computers[5]	3
PHIL	110	Critical Thinking[7]	3			PEDU/HEED Elective[6]	1
			17			PEDU/HEED Elective[6]	1
							16

[1]UNIV 101-102 required of all first-time freshmen; UNIV 110, University Studies (2), required of Transfer Students with fewer than 30 credits.
[2]ENGL 108, Grammar and Usage, may be required, based on placement criteria.
[3]MATH 129 and MATH 130 are required, but profile examination may indicate that MATH 121 must be completed as a prerequisite.
[4]Humanities/Fine Arts Elective: Select one course from ART 210, ART 211, ENGL 211, ENGL 212, ENGL 220, ENGL 223, ENGL 240, HUMN 211, HUMN 212, MUSI 210, MUSI 260, PHIL 210, PHIL 212, PHIL 220, THEA 203.
[5]Fulfills University College Restricted Elective requirement.
[6]Physical Education/Health Requirement may be fulfilled by completing HEED 112, Health and Wellness (2) OR two PEDU courses selected from PEDU 100, 101, 102, 103, 106, 107, 110, 111, 112, 120, 121, 122, 130, 132, 140, 141.
[7]PHIL 110, Critical Thinking, not required of Transfer Students with 60 or more transfer credits

Sophomore Year

First Semester				Second Semester			
MATH	142	Calculus w/Analytic Geometry I	4	MATH	241	Calculus w/Analytical Geometry II	4
CHEM	221	Organic Chemistry I	4	CHEM	222	Organic Chemistry II	5
PHYS	121	College Physics I	4	PHYS	122	College Physics II	4
FORS	**200**	**Introduction to Forensic Science**	**3**	CHEM	210	Analytical Chemistry	5
			15				18

Junior Year

First Semester				Second Semester			
CHEM	310	Instrumental Methods of Analysis	4	SPEE	200	Introduction to Speech	3
FORS	**300**	**Forensic Professional Practice**	**3**	CHEM	321	Thermodynamics and Equilibrium	3
CRJC	200	Intro. to Criminal Justice System[1]	3	CRJC	202	Legal Aspects of Criminal Justice	3
MATH	242	Calculus w/Analytic Geometry III	4	STAT	202	Basic Probability and Statistics	3
		Foreign Language I[2]	3			Foreign Language II[2]	3
			17				15

[1]Fulfills University College History/Social Science requirement.
[2]Fulfills University College Restricted Elective Requirement.

Senior Year

First Semester				Second Semester			
FORS	**420**	**Anal. Methods in For. Science I**	**4**	**FORS**	**430**	**Anal. Methods in For. Science II**	**4**
FORS	**400**	**Forensic Microscopy**	**4**	**FORS**	**440**	**Internship[1]**	4
FORS	**410**	**Technical Writing in For. Science**	**3**	CHEM	410	Seminar in Chemical Literature	1
CHEM	322	Quantum Mechanics/Spectroscopy	3	CHEM	330	Principles of Inorganic Chemistry	3
			14				12

BOLD: Courses to be developed
[1]At SBI, etc. during the semester

COURSE DESCRIPTIONS

Bachelor of Science in Forensic Science with Concentrations in Biology or Chemistry

FORS 200 Introduction to Forensic Science (3-3-0)
This course introduces the basic principles and relationships between the applications of chemistry, biology, and physics to forensic science as they relate to the criminal investigative process. The course is designed to give students insight into the many areas of forensic science and to study the newest techniques used by forensic laboratories. *Prerequisite: CHEM 140 General Chemistry I, CHEM 160 General Chemistry II, and BIOL 150 Principles of Biology; all with a grade of C or better; Co-requisite: PHYS 111 General Physics I or PHYS 121 College Physics I*

FORS 300 Forensic Professional Practice (3-3-0)
Provides basic knowledge of proper crime scene procedures and evidence processing that includes proper collection, documentation and preservation of physical evidence. In addition, the ethical issues relating to pre-trial procedures, courtroom testimony and qualification of expert witnesses will be presented. *Prerequisite: FORS 200 Introduction to Forensic Science; Co-requisite: CRJC 200 Introduction to the Criminal Justice System.*

BIOL 325/FORS 325 Molecular Biology (3-2-2)
An in depth study of the structure, function, and biochemistry of proteins and nucleic acids. Isolation, purification and structural modification of DNA and protein in laboratory exercises will be utilized to provide an understanding of the various DNA/protein methodologies and their applicability to forensic science. *Prerequisite: BIOL 200 Cellular Biology; CHEM 221 Organic Chemistry I; CHEM 222 Organic Chemistry II*

FORS 400 Forensic Microscopy (4-3-3)
This course will familiarize students with the microscopy equipment common to most modern crime labs. The course will enable students to select the most appropriate equipment and techniques and to make basic observations of the physical and optical properties of common evidential materials. This class is an introduction to various types of microscopy used in forensic science. The course is an introduction to microscopic analysis, identification, and characterization of materials, such as glass, hair, fiber, paint, and soil. *Prerequisite: FORS 200 Introduction to Forensic Science*

FORS 410 Technical Writing in Forensic Science (3-3-0)
This course provides students with a working knowledge of various types of technical and scientific communication, including writing proposals, instructions, and forensic reports for both specialist and nonspecialist. It aims to enable the students to present information professionally in clear, concise and appropriate format. It deals with ethical issues involved in professional technical writing. Formal elements of reports with library research are also emphasized. *Prerequisite: FORS 200 Introduction to Forensic Science; FORS 300 Forensic Professional Practice*

FORS 420 Analytical Methods in Forensic Science I (4-3-3)

Applications of spectroscopic methods to forensic science. Background and applications of ultraviolet/visible spectroscopy, Fourier-transfer infrared spectroscopy, fluorescence spectroscopy, gas chromatography, and mass spectroscopy will be discussed. *Prerequisite: FORS 200 Introduction to Forensic Science; CHEM 222 Organic Chemistry II with a grade of C or better.*

FORS 430 Analytical Methods in Forensic Science II (4-2-6)

Applications of separation methods to forensic science. Techniques covered will include gas chromatography, liquid chromatography, and capillary electrophoresis. *Prerequisite: FORS 420 Analytical Methods in Forensic Science I, with a grade of C or better*

FORS 431/BIOL 431 Population Genetics (3-2-2)

A study of the genetic and ecological forces that influence the structure of populations with two (2) hours of laboratory exercises and experimental studies. Students will evaluate the effects of random genetic drifts, mutation, natural selection, inbreeding, assortative mating, molecular evolution and quantitative/ecological genetics on populations. *Prerequisite: ZOOL 410 Principles of Genetics*

FORS 440 Internship (4-0-4)

A field internship that allows students to integrate theory with hands on experience through independent laboratory work and study at an affiliated crime laboratory. The internship must be performed in an approved agency under the supervision of a faculty member. The student will spend 1-3 week rotations in the major areas of the crime laboratory, such as instrumental analysis, toxicology/drug analysis, DNA analysis and trace analysis. *Prerequisite: FORS 200 Introduction to Forensic Science; FORS 300 Forensic Professional Practice; FORS 420 Analytical Methods in Forensic Science I; FORS 400 Forensic Microscopy; FORS 410 Technical Writing in Forensic Science*

FORS 450 DNA Analysis in Forensic Science (4-2-6)

Applications of DNA isolation and detection methods. Techniques covered will include Polymerase Chain Reaction, isolation of genomic DNA, RFLP analysis, DNA electrophoresis, etc. *FORS 325 Molecular Biology, with a grade of C or better*