

## **DEPARTMENT OF CHEMISTRY**

### **Bachelor of Arts CHEMISTRY MAJOR (DNA Analysis Option) 2005-2006**

This degree program provides the educational background necessary for those interested in pursuing careers in forensic DNA analysis, and is patterned after the required Standards for Forensic DNA Testing Labs. These standards require DNA examiners/analysts to have a minimum of a B.A./B.S. degree in chemistry, biology, or forensic science with course work that covers “biochemistry, genetics, and molecular biology or other subjects which provide a basic understanding of the foundation of forensic DNA analysis...” In addition, courses or training in statistics and population genetics as applied to forensic DNA analysis are required. Students who are interested in careers working as DNA examiners/analysts must also have at least six months of experience in a forensic DNA lab, and must pass a qualifying test. Thus, this degree program provides the educational background necessary for those interested in careers in forensic DNA analysis.

#### **FACULTY ADVISORS:**

Dr. Mohammed Ali, Dr. Marcus Bond, Dr. Sharon Coleman, Dr. Philip Crawford, Dr. Matthew Fasnacht, Dr. Bruce Hathaway, Dr. James McGill, Dr. Bjorn Olesen, Dr. Michael Readnour, Dr. David Ritter, Dr. Michael Rodgers

#### **CAREER OPPORTUNITIES:**

B.A. chemists employed by government or private industry are typically involved in research, product development, synthesis, forensic analysis, quality control, industrial hygiene and safety, or testing for environmental regulation compliance. Many B.A. chemists tend to go into technical management, marketing, or sales (e.g. pharmaceuticals, chemicals, and instruments). Some use their computer skills in information retrieval, computer modeling, process automation, and software development and evaluation. Others may use their writing skills to become technical writers.

Forensic scientists typically work in crime laboratories run by city, county, or state governments, or for Federal agencies such as the FBI, Drug Enforcement Administration (DEA), Bureau of Alcohol, Tobacco, and Firearms (ATF), and U.S. Postal Inspections. Private labs are also increasingly becoming more involved in forensic DNA analysis.

#### **EMPLOYMENT OUTLOOK / SALARIES:**

According to Chemical and Engineering News, forensic chemistry, particularly DNA analysis, is on the verge of explosive growth. It is predicted that 10,000 new forensic scientists will be needed over the next decade to address the expanding backlog of DNA evidence alone. The median starting salary for BA chemists was around \$33,000 according to the ACS 2004 salary survey. (ACS data shows a direct relationship between GPA and starting salaries for BS chemists, i.e. those with higher GPA's generally start at higher salaries.) The median salary for all employed BS chemists was \$59,700 according to the ACS 2003 salary survey.

**HIGH SCHOOL PREPARATION FOR MAJOR:**

Ideal: 4 units of English, 3 units of Science (Biology, Chemistry, and Physics), and Math through Trigonometry and Pre-calculus.

**Bachelor of Arts**  
**CHEMISTRY MAJOR**  
(DNA Analysis Option)

**Proposed Requirements for BA Chemistry Major – DNA Analysis – No Minor Required**

	<u>Credit Hours</u>
<b>University Studies Core Curriculum</b>	<b>30*</b>
The University Studies Core Must include:	
Living Systems: BI151 Biological Reasoning	
Oral Expression: SC105 Fundamentals of Oral Communication	
<b>UI100 First Year Seminar</b>	<b>3</b>
<b>University Studies Interdisciplinary Courses (UI3XX)</b>	<b>3*</b>
<b>Required Courses (pre-requisites)</b>	<b>41</b>
CH185/005/085 General Chemistry I (MA095 or equiv)	5**
CH186 General Chemistry II (CH185)	3
CH187 Qualitative Analysis (CH186 pre or co)	2
CH271 Quantitative Analysis (CH187), offered Fall only	4
CH341 Organic Chemistry I (CH186)	4
CH342 Organic Chemistry Laboratory I (CH341 pre or co)	1
CH310 Introduction to Physical Chemistry (MA 139,CH271, PH121 or PH230), offered Fall only	5
CH498 Professional Presentation in Chemistry (UI443)	1
MA139 Applied Calculus (MA134 or equiv.)	3**
PH120/020 Introductory Physics I (MA133 and MA134 or equiv.)	5
PH121/021 Introductory Physics II (PH120)	5
UI443 Professional Experience in Chemistry, offered Spring only	3**
<b>DNA Analysis Requirements</b>	<b>21</b>
BI200 Microbiology	3
BI381 Genetics (BI200, MA134)	3
BI245 Lab Methods in Biotechnology (BI200)	3
BI450 Molecular Biology (BI200, BI381, CH341, CH342)	3
UI331 Biochemistry I (CH342)**	3
CJ526 Statistical Analysis in Criminal Justice (MA134 or equiv.)	3
CS483 Independent Studies in Computer Science (Bioinformatics)	3
<b>Other Forensic Requirements</b>	<b>4</b>
CH420 Forensic Chemistry (CH342)	4
<b>Electives</b>	<b>18</b>
EN100 English Composition	0-3
WP-003 75 Hour Writing Test	0
<b>Minimum Degree Requirement</b>	<b>120</b>

\*Does not include hours for University Studies courses included in core curriculum.

\*\*University Studies course

## Notes

1. Completion of an Experimental Learning Experience in the major (undergraduate research, internship) is required of all graduates effective Spring of 2003. Requirement met by completion of CH498 Professional Presentation in Chemistry. Consult with your departmental advisor.
2. Required courses offered in both Fall and Spring semesters unless otherwise specified.

**B.A. in Chemistry**  
**(DNA Analysis Option)**  
**Suggested 8 Semester Sequence<sup>♦</sup>**

<b>First Semester</b>	<b>Hrs.</b>	<b>Second Semester</b>	<b>Hrs.</b>
UI100 First Year Seminar	3	CH186 General Chemistry II	3
CH185 General Chemistry I Lecture	5	CH187 Qualitative Analysis	2
CH085 General Chemistry I Lab.	+	University Studies Electives	3
CH005 General Chemistry I Rec.	+	EN140 Rhetorical & Critical Thinking	3
MA139 Applied Calculus	3	BI151 Biological Reasoning	3
EN100 English Comp.	3		
<b>Third Semester*</b>	<b>Hrs.</b>	<b>Fourth Semester</b>	<b>Hrs.</b>
CH271 Quant. Analysis	4	CH341 Organic Chemistry I	4
PH120 Intro. Physics I Lecture	5	CH342 Organic Chemistry Lab I	1
PH020 Intro. Physics I Lab	+	PH121 Intro. Physics II Lecture	5
University Studies Elective	3	PH021 Intro. Physics II Lab	+
BI200 Microbiology	3	University Studies Elective	3
		BI245 Lab Methods in Biotechnology	3
<b>Fifth Semester</b>	<b>Hrs.</b>	<b>Sixth Semester</b>	<b>Hrs.</b>
CH310 Intro. to Physical Chemistry	5	UI443 Prof. Experience in Chemistry	3
University Studies Electives	6	UI3XX University Studies	3
BI381 Genetics	3	University Studies Elective	3
Elective	3	Elective	6
		WP003 75 Hour Writing Exam	0
<b>Seventh Semester</b>	<b>Hrs.</b>	<b>Eighth Semester</b>	<b>Hrs.</b>
CH420 Forensic Chemistry	4	CH498 Professional Present. in Chemistry	1
UI331 Biochemistry	3	BI450 Molecular Biology	3
CS483 Bioinformatics	3	CJ526 Stat. Analysis in Criminal Justice	3
University Studies Elective	6	Electives	6

<sup>♦</sup>Assumes all prerequisites have been met for each course.

\*Since all chemistry courses numbered 200 and above may only be offered one semester a year, it is strongly recommended that all chemistry majors consult with a chemistry staff member before the end of their freshman year.