

DEPARTMENT OF CHEMISTRY

Bachelor of Science CHEMISTRY MAJOR (Biochemistry Option) 2005-2006

This degree program is designed to prepare students for a career as a professional chemist in the chemical industry by providing students with a formal education in chemistry with a concentration in biochemistry. Students completing this degree program will be prepared to pursue employment in chemistry and biotechnology, graduate studies in chemistry, biochemistry, and molecular biology, or professional programs of study (medicine, dentistry, etc.).

FACULTY ADVISOR:

Dr. Bjorn Olesen

CAREER OPPORTUNITIES:

Job opportunities for students with a chemistry degree with an emphasis in biochemistry include:

Drug Discovery (bioinformatics, proteomics, high throughput screening, assay development, medicinal chemists)

Drug Development (process development engineers, fermentation specialists, protein purification specialists, process chemists, formulation specialists, drug delivery specialists)

Operations (manufacturing, quality control/quality assurance, validations specialists, bioanalytical chemists)

Regulatory and Clinical (clinical research associates, regulatory specialists, Chemistry Manufacturing and Controls specialists, project managers)

Business (business development, licensing, technology transfer, intellectual property attorneys)

EMPLOYMENT OUTLOOK:

Employment trends in biotechnology continue on an upward trend. According to Consulting Resources Corporation (Lexington, MA) the current number of people employed in this area is approximately 400,000 worldwide. This number is expected to grow by 750,000 by the year 2011. The median starting salary for BS chemists was around \$32,500 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.) 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 English, 3 units of Science (Biology, Chemistry, Physics), and Math through Trigonometry and Pre-calculus.

Bachelor of Science
CHEMISTRY MAJOR
 (Biochemistry Option)

Requirements for Chemistry Major (Biochemistry Option), B.S. Degree

	Proposed Hours
University Studies Core Curriculum	30*
University Studies Interdisciplinary Courses	3*
UI-100 First Year Seminar	3
Required Courses (pre-requisites)	60
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
CH343 Organic Chemistry II (CH342 pre or co)	3
CH344 Organic Chemistry Laboratory II (CH343 pre or co)	2
CH311 Physical Chemistry I (CH271, PH121 or PH231, MA240 pre or co), offered Fall only	4
CH312 Physical Chemistry II (CH311), offered Spring only	3
CH313 Physical Chemistry Laboratory (CH312 pre or co), offered Spring only	3
CH498 Professional Presentation in Chemistry (UI443)	1
MA140 Analytical Geometry and Calculus I (MA133 and MA134 or equiv)	5**
MA145 Analytical Geometry and Calculus II (MA140)	4
MA240 Analytical Geometry and Calculus III (MA145)	3
PH120/020 Introductory Physics I (MA133 and MA134 or equiv.)	5
PH121/021 Introductory Physics II (PH120)	5
OR	
PH230/030 General Physics I (MA145 pre or co)	5
PH231/031 General Physics II (MA240 pre or co and PH230)	5
UI443 Professional Experience in Chemistry, offered Spring only	3**
Required courses for Biochemistry Concentration	20
CH531/UI331 Biochemistry I (CH342), offered Fall only	3**
CH532 Biochemistry II (CH531 or UI331), offered Spring only	2
CH533 Biochemistry Lab (CH531/UI331 pre or co), offered Fall only	2
BI190 Life Processes (One year of H.S. Chemistry)	4
BI200 General Microbiology (BI190)	3
BI381 Genetics (BI200 and MA134)	3
BI404 Cell Biology (BI381 and CH342)	3
Electives (Note 3)	4
EN100 English Composition	0-3
WP-003 75 Hour Writing Test	0
Minimum Degree Requirement	120

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

**University Studies course

Notes:

1. Required courses offered in both Fall and Spring semesters unless otherwise specified.
2. **Completion of an experiential learning project (undergraduate research, internship) in the major is required of all graduates effective Spring 2003. Requirement met by completion of CH498 Professional Presentation in Chemistry. Consult with your departmental advisor.**
3. **American Chemical Society certification of the biochemistry concentration may be achieved by the completion of any of the following courses: CH391 Undergraduate Research (1), CH392 Undergraduate Research (2), CH447 Advanced NMR Techniques (2), CH545 Organic Preparation and Characterization (3), CH563 Inorganic Chemistry (4), and CH575 Chemical Instrumentation (4).**

BS in Chemistry (Biochemistry Option)
Suggested 8 Semester Sequence

First Semester	Hrs.	Second Semester	Hrs.
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	+	MA140 Analyt. Geom. & Calc. I*	5
CH005 General Chemistry I Recitation	+	EN140 Rhet. & Crit. Thinking	3
University Studies Elective	3	BI190 Life Processes	4
EN100 English Comp	0-3		
Third Semester**	Hrs.	Fourth Semester	Hrs.
CH341 Organic Chemistry I	4	CH343 Organic Chemistry II	3
CH342 Organic Chemistry II Lab	1	CH344 Organic Chemistry I Lab	2
PH230 General Physics I Lecture	5	PH231 General Physics II Lecture	5
PH030 General Physics I Lab	+	PH031 General Physics II Lab	+
or		or	
PH120 Intro. Physics I Lecture	5	PH121 Intro. Physics II Lecture	5
PH020 Intro. Physics I Lab	+	PH021 Intro. Physics II Lab	+
MA145 Analyt. Geom. & Calc. II	4	University Studies Elective	3
		BI200 General Microbiology	3
Fifth Semester	Hrs.	Sixth Semester	Hrs.
CH271 Quantitative Analysis	4	University Studies Electives	6
University Studies Electives	3	UI443 Professional Experiences in Chemistry	3
MA240 Analyt. Geom. & Calc. III	3	WP003 75 Hour Writing Exam	0
CH531/UI331 Biochemistry I***	3	CH532 Biochemistry II	2
CH533 Biochemistry Lab	2	BI381 Genetics	3
Seventh Semester	Hrs.	Eighth Semester	Hrs.
CH311 Physical Chemistry I	4	CH312 Physical Chemistry II	3
UI3XX University Studies	3	CH313 Physical Chemistry Lab	3
University Studies Elective	6	University Studies Elective	6
BI404 Cell Biology	3	CH498 Professional Presentation in Chemistry	1
		Electives	1

* The calculus sequence is very important for American Chemical Society Certification. A student unable to enter this sequence as recommended should consult the Chemistry department before enrolling if they wish to have a certified degree.

**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 their departmental advisor before the end of their Freshman year.

***UI331 Biochemistry I (3) will count as both a chemistry elective and UI3XX University Studies course.