

# CHEMISTRY, B.S. - ENVIRONMENTAL OPTION

Millersville University Department of Chemistry offers a B.S. Chemistry degree with an option in Environmental Chemistry. The curriculum offers courses whose contents are consistent with similar programs offered elsewhere and, with electives in inorganic chemistry and biochemistry, that will satisfy the guidelines of an option in Environmental Chemistry approved by the ACS. In addition to course requirements, the curriculum includes opportunities for industrial and government internship programs related to environmental analysis, engineering, and regulation. Of more immediate promise is the interest expressed by Lancaster Laboratories in generating a student internship program with the Chemistry Department. These internships include such areas as research in sampling and instrumental analysis of many different kinds of materials, toxicity and risk assessment, field testing and monitoring, drug screening, environmental law and regulations, analysis of food products, and quality assurance in the chemical laboratory.

## Major in Chemistry, BS

Code	Title	Hours
Credits Required for Major		
	true	
Minimum GPA 2.0 for Major		
	true	
Minimum credits for 50% residency		
	true	
CHEM 188 WAIVED FOR TRANSFER STUDENTS		
100 AND 200 LEVEL CHEMISTRY REQUIRED COURSES		3
A grade of C or better is required in the 100/200 level courses before proceeding to the courses for which they are pre-requisites.		
CHEM 111	Introductory Chemistry 1 (C minimum)	
CHEM 112	Introductory Chemistry 2 (C minimum)	
CHEM 231	Organic Chemistry 1 (C minimum)	
CHEM 232	Organic Chemistry 2 (C minimum)	
CHEM 251	Inorganic Chemistry 1 (C minimum)	
CHEM 265	Quantitative Analysis (C minimum)	
300 AND 400 LEVEL CHEMISTRY REQUIRED COURSES		2
CHEM 341	Physical Chemistry 1	
CHEM 342	Physical Chemistry 2	
CHEM 487	Seminar in Chemistry 1	
CHEM 488	Seminar in Chemistry 2	
CHEM 498	Independent Study	
CHEMISTRY OPTIONS		
Option in Environmental Chemistry - See separate block		
American Chemical Society Certification - Optional - See separate block		
<b>Total Hours</b>		<b>5</b>

## Option in Environmental Chemistry, BS

Code	Title	Hours
CHEM 375	Environmental Chemistry	0
CHEM 465	Analytical Chemistry	0
CHEM 476	Environmental Chemistry 2	0
Chemistry Electives - Choose 5 hours from:		5
CHEM 300	Co-Op Ed Experience in Chem	
CHEM 312	Chemistry in Nanotechnology	
CHEM 324	Plant Biochemistry	
CHEM 326	Biochemistry 1	
CHEM 327	Biochemistry 2	
CHEM 328	Analytical Biochemistry Lab	
CHEM 381	Polymer Chemistry 1	
CHEM 391	Advanced Laboratory 1	
CHEM 392	Advanced Laboratory 2	
CHEM 400	Co-Op Ed Experience in Chem	
CHEM 435	Advanced Organic Chemistry	
CHEM 452	Inorganic Chemistry	
CHEM 486	Topics in Chemistry	
CHEM 489	Honors Course	
CHEM 498	Independent Study	
CHEM 499	Departmental Honors	
CHEM 500		
<b>Total Hours</b>		<b>5</b>

## American Chemical Society Certification - Optional

Code	Title	Hours
THIS BLOCK IS NOT REQUIRED FOR DEGREE COMPLETION. The following block contains courses which are required/recommended to students opting for ACS Certification. While not required, an introductory Economics course, elementary German or Russian (GERM/RUSS 101 and 102) are recommended for inclusion in the core Liberal Arts core requirements for general education. Students must take a minimum of two hours of CHEM 489, 498, or 499 (Research) under Chemistry Electives. This means you will need a total of 3 credits in CHEM 489, 498 or 499.		
<b>REQUIRED COURSES FOR ACS CERTIFICATION</b>		
CHEM 326	Biochemistry 1	0
CHEM 392	Advanced Laboratory 2	1
Required Independent Research - Choose 3 hours from:		3
CHEM 489	Honors Course	
CHEM 498	Independent Study	
CHEM 499	Departmental Honors	
<b>RECOMMENDED COURSES FOR ACS CERTIFICATION</b>		
Introductory Economics - Optional Recommended		0
Elementary Language German or Russian - Optional Recommended		0
<b>Total Hours</b>		<b>4</b>

## Req Related for Chemistry, BS

Code	Title	Hours
<b>MATHEMATICS</b>		
Calculus I or Honors Calculus - Choose 1 of the following:		4-5
MATH 161	Calculus 1	

MATH 163H	Honors Calculus 1	
MATH 211	Calculus 2	4
MATH 311	Calculus 3	4

**PHYSICS**

PHYS 231	Physics 1 with Calculus	0
PHYS 232	Physics 2 with Calculus	0

**BIOLOGY COMPETENCY**

## General Biology

Competency may be demonstrated with credits earned for BIOL 100 through any of the following: 1) a successful score on either the national AP Biology exam or the Biology CLEP exam. 2) a passing grade for General Biology (BIOL 100) or equivalent.

**Environmental Chemistry Related Directed Electives**

undefined - Choose 2 of the following: 0-8

BIOL 211	Concepts of Zoology	
BIOL 221	Concepts of Botany	
BIOL 241		
BIOL 340	Prspctv in Environm Awareness	
BIOL 343	Principles of Ecology & Evolution	
ESCI 245	Environmental Meteorology	
ESCI 322	Environmental Hydrology	
ESCI 349	Chemistry of the Atmosphere	
ESCI 426	Groundwater Resources and Contamination	
GEOG 202	Environmental Sustainability	
GEOG 230	Physical Geography	
GEOG 304	Water Resources Management	
OSEH 321	Environmental & Industrial Hygiene I - Chemical and Biological Hazards	
OSEH 422	Environmental & Industrial Health II - Physical Hazards	
OSEH 435	Environmental Health	

Other relevant environmental courses may also be selected by consulting with your academic advisor and submitting an exception to graduation requirements. A related minor may be earned by completing the minor requirements that include courses from the disciplines above.

**Total Hours** 12-21