CHEMISTRY, B.S. - ENGINEERING INSTRUMENTATION AUTOMATION OPTION

The B.S. Chemistry degree with an option in Engineering Instrumentation Automation is focused on using, controlling, and improving instruments for chemical analysis and interpreting/analyzing data. Many chemistry employment opportunities exist in analytical laboratories or graduate school where sophisticated instrumentation is used extensively. This option maintains a core chemistry curriculum and supplements the chemistry knowledge content with industrial electronics, control systems, and robotics. This option is a unique learning experience available at Millersville due to the collaboration of the Department of Chemistry and the Department of Applied Engineering Safety and Technology. Graduate of this option will be well prepared for positions where instrumentation and analysis plays a key role.

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	Freshman Seminar in Chemistry	1
100 AND 200 LEVEL CHEMISTRY REQUIRED COURSES		
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)	4
CHEM 112	Introductory Chemistry 2 (C minimum)	4
CHEM 231	Organic Chemistry 1 (C minimum)	4
CHEM 232	Organic Chemistry 2 (C minimum)	4
CHEM 251	Inorganic Chemistry 1 (C minimum)	3
CHEM 265	Quantitative Analysis (C minimum)	4
300 AND 400 LEVEL CHEMISTRY REQUIRED COURSES		
CHEM 341	Physical Chemistry 1	4
CHEM 342	Physical Chemistry 2	4
CHEM 487	Seminar in Chemistry 1	0.5
CHEM 488	Seminar in Chemistry 2	0.5
Independent Study - Choose 1 hour from:		1
CHEM 498	Independent Study	
CHEMISTRY OPTIONS		
Option in Engineering Instrumentation Automation - See separate block		
Total Hours		**34**

Option in Chemistry, Engineering Inst. Automat, BS

Code	Title	Hours
CHEM 391	Advanced Laboratory 1	1
CHEM 465	Analytical Chemistry	4
Chemistry Electives - Choose 8 hours from:		8
CHEM 300	Co-Op Ed Experience in Chem	
CHEM 312	Chemistry in Nanotechnology	
CHEM 326	Biochemistry 1	
CHEM 327	Biochemistry 2	
CHEM 328	Analytical Biochemistry Lab	
CHEM 375	Environmental Chemistry	
CHEM 381	Polymer Chemistry 1	
CHEM 392	Advanced Laboratory 2	
CHEM 400	Co-Op Ed Experience in Chem	
CHEM 435	Advanced Organic Chemistry	
CHEM 452	Inorganic Chemistry	
CHEM 476	Environmental Chemistry 2	
CHEM 482	Polymer Chemistry 2	
CHEM 486	Topics in Chemistry	
CHEM 489	Honors Course	
CHEM 498	Independent Study	
CHEM 499	Departmental Honors	
CHEM 500		
Total Hours		**13**

Req Related for Chemistry, BS

Code	Title	Hours
MATHEMATICS		
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	5
PHYS 232	Physics 2 with Calculus	5
CONTROL SYSTEMS		
AENG 261	Electronic Systems	3
AENG 325	Power Conversion and Control	3
AENG 425	Industrial Robotic Systems	3
Programming Logic Controllers		3
AENG 427	Programmable Logic Controllers	
Total Hours		**34-35**