CHEMISTRY, B.S. - NANOTECHNOLOGY OPTION

The Chemistry Department at Millersville offers a B.S. Chemistry degree with an option in Nanotechnology. The curriculum includes courses that give students a strong background in chemistry and electives in nanotechnology and other sciences. As part of the current program, students spent a semester at Penn State University Park Campus to gain practical experience in nanofabrication and the use of clean room facilities. Nanotechnology - which is the control of materials at very small dimensions to make smaller, cheaper and better products is being adopted in many industries. Upon graduation students can pursue graduate studies in chemistry or materials sciences, or work in industry or government usually in an environment involving interaction with scientists from other disciplines such as biology, physics and engineering.

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 Nanotechnology - See separate block		
Total Hours		**34**

Option in Nanotechnology, Chemistry, BS

Code	Title	Hours
CHEM 312	Chemistry in Nanotechnology	3
Electives - Choose 4 hours from:		4
CHEM 300	Co-Op Ed Experience in Chem	
CHEM 326	Biochemistry 1	
CHEM 375	Environmental Chemistry	
CHEM 381	Polymer Chemistry 1	
CHEM 391	Advanced Laboratory 1	
CHEM 392	Advanced Laboratory 2	
CHEM 435	Advanced Organic Chemistry	
CHEM 452	Inorganic Chemistry	
CHEM 465	Analytical Chemistry	
CHEM 486	Topics in Chemistry	
CHEM 489	Honors Course	
CHEM 498	Independent Study	
CHEM 499	Departmental Honors	
PROFESSIONAL BLOCK PENN STATE COURSES		
Courses taken in a Capstone Semester at Penn State University in the Nanofabrication Facility.		
NFMT 311	Materials, Safety & Equipment Overview for Nanotechnology	3
NFMT 312	Basic Nanotechnology Processes	3
NFMT 313	Thin Film Utilization	3
NFMT 314	Lithography	3
NFMT 315	Materials Modification in Nanotechnology	3
NFMT 316	Characterization, Testing Nanotech Structures & Materials	3
Total Hours		**25**

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
Total Hours		**22-23**