Nanotechnology Curriculum Checklist
Chemistry/Bioengineering Emphasis

Title	Course	Cr.	Pre/Co-Requisites	Term	Grade
Bioengineering					
Bioengineering Elective	BIOENG	3			
Bioengineering Elective	BIOENG	3			
Chemistry					
General Chemistry for Engineering 1	CHEM 0960	3			
General Chemistry for Engineering 2	CHEM 0970	3	CHEM 0960		
Core Chemistry Course	CHEM	3			
Core Chemistry Course	CHEM	3			
Core Chemistry Course	CHEM	3			
Electrical & Computer Engineering					
Linear Circuits & Systems	ECE 0101	4	PHYS 0175, ENGR 0012 *Math 0280, 0290*		
Microelectronic Circuits & Lab	ECE 0102	4	ECE 0101		
Problem Solving in C++	ECE 0301	3	ENGR 0012		
General Engineering					
Introduction to Engineering Analysis	ENGR 0011	3			
Engineering Computing	ENGR 0012	3	ENGR 0011		
Materials Structures & Properties	ENGR 0022	3	PHYS 0175, MATH 0230		
Statics & Mechanics of Materials 1	ENGR 0135	3	MATH 0230, PHYS 0174		
Probability & Statistics	ENGR 0021	3	MATH 0230		
Introduction to Nanotechnology & Nanoengineering	ENGR 0240	3	MATH 0230, PHYS 0175		
Humanities & Social Sciences					
Humanities Elective*		3			
Social Sciences Elective*		3			
Humanities/Social Sciences Elective*		3			
Humanities/Social Sciences Elective*		3			
Humanities/Social Sciences Elective*		3			
Humanities/Social Sciences Elective * ‡		3			
Life Sciences					
Basic Life Science	LIFESCI	3			
Basic Life Science	LIFESCI	3			

Mathematics					
Analytical Geometry & Calculus 1	MATH 0220	4			
Analytical Geometry & Calculus 2	MATH 0230	4	MATH 0220		
Analytical Geometry & Calculus 3	MATH 0240	4	MATH 0230		
Matrices & Linear Algebra	MATH 0280	3	MATH 0220		
Differential Equations	MATH 0290	3	MATH 0230		

Mechanical Engineering					
Introduction to Thermodynamics	MEMS 0051	3	PHYS 0175, CHEM 0960		
Structures of Crystals	MEMS 1053	3	ENGR 0022		
Experimental Methods in MSE	MEMS 1010	3	ENGR 0022		
Micro/Nano Manufacturing	MEMS 1057	3			

Physics					
Physics for Science & Engineering 1	PHYS 0174	4	*MATH 0220*		
Physics for Science & Engineering 2	PHYS 0175	4	PHYS 0174, *MATH 0230*		
Lab Physics for Science & Engineering	PHYS 0219	2	*PHYS 0175*		

Program Specific					
Nanotechnology Program Elective		3			
Nanotechnology Program Elective		3			
Nanotechnology Program Elective		3			

Senior Design					
Senior Design 1[+]		3			
Senior Design 2[++]		3			

Upper-Level Physics: Physics courses with course numbers > 1000

[+] A senior design course offered by one of the other SSOE engineering programs is required. Alternatively, may be ENGR 1050 Product Realization, or with preapproval, a senior design project arranged with a faculty mentor and taken as ENGSCI 1801.
[++] A semester-long research experience under the supervision of a faculty advisor at Pitt, not necessarily within the Swanson School of Engineering. Note that this requirement may also be fulfilled by participation in an undergraduate research program like the MCSI URP or the SURI during the summer semester.

[‡]A University designated writing intensive course

*All Humanities and Social Science electives must be from the SSOE approved list. Two courses need to be in single area (see SSOE guidelines).

Italicized courses indicate co-requisites; courses must be taken prior to or concurrently.

Nanotechnology Curriculum Program Electives

Core Chemistry, Life Science and Bioengineering Course Options

Approved Nanotechnology Electives include:

Bioengineering
BIOENG 1005	RF Medical Devices and Applications of Electromagnetism in Medicine
BIOENG 1810	Biomaterials and Biocompatibility

Biological Sciences
BIOSC 0057	Foundations of Biology Research Lab 1 (1 cr.)
BIOSC 0067	Foundations of Biology Research Lab 2 (1 cr.)

Chemistry
CHEM 0310	Organic Chemistry 1
CHEM 0320	Organic Chemistry 2
CHEM 1130	Inorganic Chemistry
CHEM 1410	Physical Chemistry 1
CHEM 1420	Physical Chemistry 2
CHEM 1480	Intermediate Physical Chemistry
CHEM 1620	Atoms, Molecules & Materials – 'Introduction to Nanomaterials'

Electrical & Computer Engineering
ECE 1232	Introduction to Lasers and Optical Electronics (3 units)
ECE 1238	Digital Electronics (3 units)
ECE 1247	Semiconductor Device Theory

General Engineering
ENGR 1066	Introduction to Solar Cells and Nanotechnology

Industrial Engineering
IE 1012	Manufacture of Structural Nanomaterials

Mechanical Engineering
MEMS 1011	Structure and Properties Lab
MEMS 1048	Analysis and Characterization at the Nanoscale
MEMS 1063	Phase Transformation
MEMS 1082	Electromechanical Sensors and Actuators
MEMS 1101	Ferrous Physical Metallurgy
MEMS 1111	Materials for Energy Generation and Storage

Materials Science
MSE 2012	Computational Material Science

Physics
PHYS 0520	Modern Physical Measurements
PHYS 1370	Introduction to Quantum Mechanics 1
PHYS 1371	Introduction to Quantum Mechanics 2

CHEM 1, 2, and 3 must be selected from the following:

BIOSC 1000	Biochemistry
BIOSC 1810	Macromolecular Structure & Function
CHEM 0310	Organic Chemistry 1
CHEM 0320	Organic Chemistry 2
CHEM 0250	Analytic Chemistry
CHEM 1250	Instrument Analysis
CHEM 1410	Physical Chemistry 1
CHEM 1420	Physical Chemistry 2
CHEM 1130	Inorganic Chemistry

LIFESCI 1 and 2 must be selected from the following:

Bioengineering
| BIOENG 1070 | Introduction to Cell Biology I |
| BIOENG 1071 | Introduction to Cell Biology II |

Biological Sciences
BIOSC 0150	Foundations of Biology I
BIOSC 0160	Foundations of Biology II
BIOSC 1070	Human Physiology - UHC
BIOSC 1250	Introduction to Human Physiology

Health & Rehabilitation Sciences
| HRS 1023 | Human Physiology |

Neuroscience
| NROSCI 1000 | Introduction to Neuroscience |
| NROSCI 1003 | UHC Introduction to Neuroscience |

BIOENG 1 and 2 must be selected from the following (prerequisites must be met):

BIOENG 1005	Radiofrequency Medical Devices
BIOENG 1075	Introductory Cell and Molecular Biology Laboratory Techniques
BIOENG 1095	Special Projects
BIOENG 1150	Bioengineering Methods and Applications
BIOENG 1210	Bioengineering Thermodynamics – OR MEMS 0051 (Thermodynamics)
BIOENG 1220	Biotransport Phenomena
BIOENG 1310	Linear Systems and Electronics I – OR MEMS 0031 (Linear Circuits & Systems)
BIOENG 1320	Biological Signals and Systems
BIOENG 1330	Biomedical Imaging
BIOENG 1383	Biomedical Optical Microscopy
BIOENG 1620	Introduction to Tissue Engineering
BIOENG 1630	Biomechanics 1