

Nanotechnology Curriculum Checklist

Student:

Chemistry/Bioengineering Emphasis

Course	Title	Cr.	Grade	Term	Pre/Co-Req
Phys 0174	Phys. Sci. & Eng. 1	4			<i>Math 0220</i>
Phys 0175	Phys. Sci. & Eng. 2	4			Phys 0174, <i>Math 0230</i>
Phys 0219	Basic Lab. Physics	2			Phys 0175
Math 0220	Anal. Geo. & Calc. 1	4			
Math 0230	Anal. Geo. & Calc. 2	4			Math 0220
Math 0240	Anal. Geo. & Calc. 3	4			Math 0230
Math 0280	Mat. & Lin. Alg.	3			Math 0220
Math 0290	Diff. Eq.	3			Math 0230
Chem 0960	Gen. Chem. Eng. 1	3			
Chem 0970	Gen. Chem. Eng. 2	3			Chem 0960
CHEM 1	Core Chem. Course (Chem 0310)	3			
CHEM 2	Core Chem. Course (Chem 0320)	3			
CHEM 3	Core Chem. Course (Chem 0330, Chem 0430, Chem 0440)	3			
LIFESCI 1	Basic Life Science (Biosc 0150)	3			
LIFESCI 2	Basic Life Science (Biosc 0160)	3			
Engr 0011	Int. Eng. Analysis	3			
Engr 0012	Eng. Computing	3			Engr 0011
Engr 0020	Prob. & Statistics	4			Math 0230
Engr 0022	Mat. Str. & Prop.	3			Phys 0175, Math 0230
Engr 0135	Statics & Mech. Matls 1	3			Math 0230, Phys 0174
Engr 0240	Int. N'tech. & N'eng.	3			
Ece 0031	Lin. Circ. & Sys.	4			Phys 0175, Engr 0012 <i>Math 0280, Math 0290</i>
Ece 0102	Microelectronic Cir.	4			Ece 0031
Ece 0301	Problem Solving C++	3			Engr 0012
BIOENG 1	Core Bioeng.	3			

BIOENG 2	Core Bioeng.	3			
Mems 0051	Intro. Thermodynamics	3			Phys 0175, Chem 0960
Mems 1010	Exp. Meth. In MSE	3			Engr 0022
Mems 1053	Struct. of Crystals	3			Engr 0022
Mems 1057	Micro/Nano Manuf.	3			
	Nano Prog. Elect.*	3			
	Nano Prog. Elect.	3			
	Nano Prog. Elect.	3			
	Senior Design 1 ⁺	3			
	Senior Design 2 ⁺⁺	3			
	Hum. Elective [‡]	3			
	Soc. Sci. Elective [‡]	3			
	Hum./Soc. Sci. El. [†]	3			
	Hum./Soc. Sci. El. [†]	3			
	Hum./Soc. Sci. El. ^{††}	3			
	Hum./Soc. Sci. El. [†]	3			

⁺ A senior design course offered by one of the other SSOE engineering programs is required.

⁺⁺ May be ENGR 1050 Product Realization, or with preapproval a senior design project arranged with a faculty mentor and taken as ENGSCI 1801. Students wishing to complete a two-term project with a faculty mentor may request approval for the second term to count as a program elective (ENGSCI 1802).

* One of the Nano. Prog. Electives must be a basic science course. Three credits of basic science lab courses can constitute a three credit Nano Prog. Elective.

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

[†] Writing intensive course

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

Nanotechnology Curriculum Program Electives and Core Chemistry, Life Science and Bioengineering Course Options – Chemistry/Bioengineering

Approved Nanotechnology Electives include:

CHEM 0310	Organic Chemistry 1
CHEM 0320	Organic Chemistry 2
CHEM 1450	Molecular Modeling and Graphics
CHEM 1410	Physical Chemistry 1
CHEM 1420	Physical Chemistry 2
CHEM 1480	Intermediate Physical Chemistry
CHEM 1130	Inorganic Chemistry
CHEM 1620	Atoms, Molecules & Materials – ‘Introduction to Nanomaterials’
PHYS 0577	Modern Physical Measurements
PHYS 1370	Introduction to Quantum Physics 1
PHYS 1371	Introduction to Quantum Physics 2
PHYS 1363	Photonics 1
PHYS 1364	Photonics 2
PHYS/CHEM 1375	Foundations of Nanoscience
BIOSEC 0050	Foundations of Bio. Lab 1 (1 cr.)
BIOSEC 0060	Foundations of Bio. Lab 2 (1 cr.)
BIOENG 1005	RF Medical Devices and Applications of Electromag. in Medicine
BIOENG 1532	Bioseparation
BIOENG 1601	Principles and Properties of Complex Engineered Materials
BIOENG 1810	Biomaterials and Biocompatibility
ECE 1232	Introduction to Lasers and Optical Electronics (3 units)
ECE 1238	Digital Electronics (3 units)
ECE 1247	Semiconductor Device Theory
ECE 2295	Nanosensors
ENGR 1065	Nanomanufacturing and Nanomaterials for Photovoltaics
ENGR 1066	Introduction to Solar Cells and Nanotechnology

IE 1012	Manufacture of Structural Nano-Materials
MEMS 1011	Structure and Properties Lab
MEMS 1048	Analysis and char. at the Nanoscale
MEMS 1063	Phase Transformation
MEMS 1082	Electromechanical Sensors and Actuators
MEMS 1101	Ferrous Physical Metallurgy
MEMS 1111	Matls. For Energy Generation and Storage
MEMS 1477	Thin Film Processes and Characterization

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

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
CHEM 1590	Molecular Biophysics
BIOESC 1000	Principles of Biochemistry
BIOESC 1810	Macromolecular Structure

LIFESCI 1 and 2 must be selected from the following:

BIOENG 1070	Cell Biology I
BIOENG 1071	Cell Biology II
BIOESC 0150	Foundations of Biology I
BIOESC 0160	Foundations of Biology II
BIOESC 1070	Human Physiology - UHC
BIOESC 1250	Introduction to Human Physiology
HRS 1020	Introduction to Anatomy and Physiology

HRS 1022	Human Anatomy
HRS 1023	Human Physiology
HRS 1024	Introduction to Neurosciences
NROSCI 1000	Intro 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 1061	Human Factors Engineering
BIOENG 1075	Introductory Cell and Molecular Biology Laboratory Techniques
BIOENG 1095	Special Projects
BIOENG 1150	Bioengineering Methods and Applications
BIOENG 1210	Bioengineering Thermodynamics
BIOENG 1220	Biotransport Phenomena
BIOENG 1241	Societal, Political, Ethical Issues in Biotechnology
BIOENG 1310	Linear Systems and Electronics I
BIOENG 1311	Hemodynamics and Biotransport
BIOENG 1320	Linear Systems and Electronics II
BIOENG 1330	Biomedical Imaging
BIOENG 1383	Biomedical Optical Microscopy
BIOENG 1384	Application of NMR Spectroscopy in Medicine
BIOENG 1531	Fundamentals of Biochemical Engineering
BIOENG 1601	Principles and Properties of Complex Engineered Materials
BIOENG 1620	Introduction to Tissue Engineering
BIOENG 1630	Biomechanics 1

Other appropriate courses may be approved as Nanotechnology Electives by the Program Director