

# Engineering Science - Nanotechnology Concentration

by semester

**Total credits: 128**

*revised June 2020*

<i>First Semester</i>			<i>Second Semester</i>		
APMA 1110	Single Variable Calculus	4	APMA 2120	Multivariable Calculus	4
CHEM 1410	Intro Chemistry for Engineers I	3	PHYS 1425	General Physics I	3
CHEM 1411	Intro Chemistry Lab	1	PHYS 1429	Physics Workshop	1
ENGR 1624	Intro to Engineering	4	CS 111x	Intro to Programming	3
STS 1500	Sci, Tech and Contemp Issues	3	MSE 2090	Intro to Materials <sup>(1)(4)</sup> (Math & Sci Elec)	3
		15		HSS elective	3
					17
<i>Third Semester</i>			<i>Fourth Semester</i>		
APMA 2130	Ordinary Differential Equations	4		Advanced Math/CS elective <sup>(3)</sup>	3
PHYS 2415	General Physics II	3	MSE 3050	Thermo and Kinetics of Mats <sup>(4)</sup>	3
PHYS 2419	Physics Workshop	1	MSE 3101	Materials Science Investigations <sup>(4)</sup>	3
ENGR 3610	Nanoscale Devices and Systems <sup>(2)(9)</sup>	3	CHEM1420/1	Chemistry II (Science Elective) <sup>(5)</sup>	4
ENGR 2500	Intro to Nanoscience and Tech <sup>(1)(9)</sup>	3	STS 3110	Societal Dimensions of Nano (rec.)	3
	HSS Elective	3			
		17			16
<i>Fifth Semester</i>			<i>Sixth Semester</i>		
MSE 3060	Structure and Defects of Mats <sup>(4)</sup>	3	MSE 3080	Corrosion, Fuel Cells, Batt. <sup>(4)</sup>	3
MSE 3670	EMOP <sup>(4)(9)</sup>	3	ECE 4140	Fundmentls of Nanoelectronics <sup>(9)</sup>	3
MAE 3130	Nanoscale Thermo & Heat Transfer	3		Secondary Minor Elective <sup>(6)</sup>	3
	Secondary Minor Elective <sup>(6)(9)</sup>	3		Secondary Minor Elective <sup>(6)</sup>	3
ECE 3103	Solid State Dev. ( rec.Tech Elec.)	3		Unrestricted elective	3
				HSS elective	3
		15			18
<i>Seventh Semester</i>			<i>Eighth Semester</i>		
STS 4500	STS & Engineering Practice	3	STS 4600	Eng, Ethics & Prof. Responsibility	3
	Nanotech Advanced Indep. Project <sup>(8)</sup>	3		Nanotech Adv. Indep. Project <sup>(8)</sup>	3
CHE 4442	Applied Surface Chemistry <sup>(9)</sup>	3		Secondary Minor Elective <sup>(6)</sup>	3
MSE 4055	Nanoscale Science and Tech <sup>(4)(9)</sup>	3		Secondary Minor Elective <sup>(6)</sup>	3
	Unrestricted elective <sup>(7)</sup>	3		Unrestricted elective <sup>(7)</sup>	3
		15			15

1 - Math and Science Elective: Chosen from the SEAS Undergraduate Dean's Office Approved List of Math and Science Electives, available online and in A-122 Thronton.

ENGR 2500 is recommended for Nanotech concentration, but is not required.

MSE 2090 and ENGR 2500 are offered in both fall and spring, which allows for flexibility in fulfilling the Math and Science Elective.

2 - ENGR 3610 is required for the nanotechnology concentration. Both ENGR 2500 and ENGR 3610 may be included in the nanotech con.

3 - Advanced math/CS elective: 3xxx-level or higher mathematics courses in SEAS or CLAS; or one 2xxx-level or higher course in computer science.

4 - A minor in MSE is a component of the concentration. MSE 2090, 3050, 3060, and 3101 are required. One additional MSE course is required for the minor. If MSE 3670 and MSE 4055 are selected for the nanotechnology concentration, then other MSE courses should be used to fulfill the 5-course minor. MSE 3080 is recommended for the minor.

5 - Science Elective: Either CHEM 1420 with lab or PHYS 2620 is required.

6 - Secondary minor electives must be chosen so as to earn an approved technical minor in SEAS, mathematics, or a natural science. Nanotechnology students may add additional MSE concentration courses and tech electives in place of the secondary minor. Check minor department requirements for number of courses and prereqs.

7 - Unrestricted electives may be chosen from any graded course in the University except mathematics courses below MATH 1310, including STAT 1100 and STAT 1120, and courses that substantially duplicate others used for the student's degree.

8 - The Advanced Independent Project is a graded 4th-year research, independent study, or design course. Individual or group projects are possible.

9 - Area of Concentration: 5 courses - ENGR 2610 is required, then select 4 AOC courses from: MAE 3130, ENGR 2500, CHE 4442, ECE 4140, MSE 3670, MSE 4055. Technical electives include any 2xxx level or above engineering, math, or science classes.