

# Chemical Engineering (BS): Nanoscience (14CHEBS-14CHENAN)

Semester Display Effective Date: 1.2013

## FRESHMAN YEAR

Fall Semester	Credit		Spring Semester	Credit
CH 101 Chemistry, A Molecular Science <sup>4</sup>	3		CH 201 Chemistry – Quantitative Sci.	3
CH 102 General Chemistry Lab <sup>4</sup>	1		CH 202 Quantitative Chem Lab	1
E 101 Introduction to Engr & Prob Solv <sup>1</sup>	1		MA 241 Calculus II <sup>4</sup>	4
E 115 Intro to Computing Environ	1		PY 205 Physics for Engineers & Scientists I <sup>4</sup>	3
ENG 101 Academic Writing and Research <sup>1</sup>	4		PY 206 Physics for Engineers & Scientists I Lab	1
MA 141 Calculus I <sup>4</sup>	4		EC 205 Economics (or EC 201 or ARE 201)*	3
HES_*** Health & Exercise Studies Course*	1		HES_*** Health & Exercise Studies Course*	1
	<b>15</b>			<b>16</b>

## SOPHOMORE YEAR

Fall Semester	Credit		Spring Semester	Credit
CH 221 Organic Chemistry I <sup>5</sup>	3		CH 223 Organic Chemistry II <sup>5</sup>	3
CH 222 Organic Chemistry I Lab <sup>5</sup>	1		CH 224 Organic Chemistry II Lab <sup>5</sup>	1
CHE 205 Chemical Proc Prin	4		CHE 225 Chemical Proc Systems	3
MA 242 Calculus III	4		MA 341 Applied Differential Eq	3
PY 208 Physics for Engineers & Scientists II	3		MSE 201 Struct & Prop Engr Mat	3
PY 209 Physics for Engineers & Scientists II Lab	1		GEP Requirement*	3
	<b>16</b>			<b>16</b>

## JUNIOR YEAR

Fall Semester	Credit		Spring Semester	Credit
CH *** Chemistry Elective <sup>2</sup>	4		CH 437 Phys Chem for Engrs	4
CHE 311 Transport Processes I	3		CHE 312 Transport Processes II	3
CHE 315 Chem Process Thermo	3		CHE 316 Thermo of Chem & Phase Eq	3
GEP Requirement*	3		CHE 330 Chem Engr Lab I	4
GEP Requirement*	3		Free Elective	3
CHE 395 Professional Dev Seminar	1			
	<b>17</b>			<b>17</b>

## SENIOR YEAR

Fall Semester	Credit		Spring Semester	Credit
CHE 331 Chem Engr Lab II	2		CHE 435 Proc System Analy & Control	3
CHE 446 Des & Analy Chem Reactors	3		CHE 451 CHE Design II	3
CHE 450 CHE Design I	3		Nanoscience Elective <sup>3</sup>	3
Nanoscience Elective <sup>3</sup>	3		GEP Requirement*	3
GEP Requirement*	3		GEP IP Requirement*	2-3
	<b>14</b>			<b>14-15</b>

Minimum Credit Hours Required for Graduation:

125

**Major/Program requirements and footnotes:**

<sup>1</sup> Minimum grade of (C-) required.

<sup>2</sup> Chemistry electives include: (A) CH 315: Quantitative Analysis; (B) CH/TC 461: Introduction to Fiber Forming Polymers; (C) BCH 451: Biochemistry; (D) CH 610: Special Topics in Chemistry; (E) CH 615: Chemical Separations (note: an additional hour of CH 499 would also be required to total 4 hours); (F) FS 402: Food Science; (G) PCC 461: Chemistry of Polymeric Materials; (H) BCH 351 (I) FS 402

<sup>3</sup> Nanosciences Electives include: CHE/MSE 455: Polymer Technology and Engineering, CH 460: Chemical Properties of Electronic Materials, CHE 461: Polymer Sciences and Technology, CHE 462: Colloid Science and Macromolecular Physics, CHE 467: Rheology, CHE 597D: Colloidal and Macromolecular Physics, CHE 597J: Polymers at Interfaces and in Confined Geometries, E 304 Introduction to Nanoscience, ECE 331: Principles of Electrical Engineering I, CH 795M: Special Topics in Chemistry, MSE 425: Polymer Science & Technology, MSE 331: Elec Properties of Materials, MSE 460: Microelectronic Materials, PY 407: Introduction to Modern Physics, BEC 462: Bio-Nanotechnology. Additional nanoscience electives may be approved on a case-by-case basis as new courses are introduced.

<sup>4</sup> Grade of C (2.0) or higher required.

<sup>5</sup> CH 225/226 may substitute for CH 221/222 and CH 227/228 may substitute for CH 223/224.

**\*General Education Program (GEP) requirements:**

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at <http://www.ncsu.edu/uap/academic-standards/gep/courselists/index.html>.

**Health & Exercise Studies** - 2 hours to be selected from the approved GEP Health & Exercise Studies list.

- One fitness and wellness course (any Health & Exercise Studies 100-level course).
- One additional credit hour of Health & Exercise Studies activity courses.

**HUMANITIES** - 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

**SOCIAL SCIENCES** - 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205 (or EC 201 or ARE 201) taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

**ADDITIONAL BREADTH** - 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

**INTERDISCIPLINARY PERSPECTIVES** - 5-6 credits to be selected from the approved GEP Interdisciplinary Perspectives list.

**Co-requisites:**

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.

Foreign Language proficiency at the FL\_102 level will be required for graduation.