

## Focus Area Worksheets

Each Focus Area requires 18 credits of Engineering and Science Electives. Use the worksheet for your selected Focus Area to be sure you meet graduation requirements for your Focus Area. Engineering Electives can be any engineering course on the list of Technical Electives. Similarly, Science Electives can be any science course on the list of Technical Electives. Other upper-level science and engineering courses may also be acceptable as electives, but you should get them approved by the Department before enrolling.

### **Classic Chemical Engineering Focus**

Requirement	Credits	Options (where applicable)
E E 206: Circuits I	4	
BCHM 340: Gen. Biochem.	5	
Chemistry Elective	3	<b>Choose One:</b> <input type="checkbox"/> CHEM 228: Fund. Analytical Chemistry Prerequisite: CHEM 132 or 142 <input type="checkbox"/> CHEM 426: Spectrochemical Meth. of Analysis Corequisite: CHEM 301 or 324 <input type="checkbox"/> CHEM 311&312 substitution for CHEM 215N <sup>1</sup>
Engineering Elective	3	
Eng. or Science Elective	3	
TOTAL CREDITS	18	

Note:

- By taking CHEM 311 and CHEM 312 Organic Chemistry (total of 8 credits) instead of CHEM 215: Elements of Organic Chemistry (5 credits), you take 3 extra credits of organic chemistry. These credits may be used to satisfy the Chemistry Elective requirement for the Classic Focus Area. These credits may also be used as the Science Elective if you take CHEM 228 or CHEM 426 as your Chemistry Elective.

### **Biochemical Engineering Focus**

Requirement	Credits	Note
CH E 338: Bioproc in Eng	2	
CH E 438: Bioproc Eng.	2	
BCHM 340: Gen. Biochem.	5	
Engineering Elective	3	Must be outside of Chemical Engineering
Eng. or Science Electives	6	
TOTAL CREDITS	18	

## Environmental Engineering Focus

Requirement	Credits	Options (where applicable)
CHEM 228: Fund Ana Chem	3	
Env. Chem. Elective	3	<b>Choose One:</b> <input type="checkbox"/> LRES 355: Soil & Environmental Chemistry <sup>1</sup> Prerequisite: CHEM 215, LRES 201N <input type="checkbox"/> LRES 456: Pollution Science <sup>1</sup> Prerequisite: LRES 355 <input type="checkbox"/> CHEM 425: Electrochem. & Chromatography Prerequisite: CHEM 228 Corequisite: CHEM 301 or 324 <input type="checkbox"/> CHEM 426: Spectrochemical Meth. of Analysis Corequisite: CHEM 301 or 324 <input type="checkbox"/> BCHM 340: General Biochemistry (5 credits) Prerequisite: CHEM 215 or 312
Env. Eng. Electives	6	<b>Choose Two:</b> <input type="checkbox"/> CH E 444: Hazardous Waste Management Prerequisite: Junior standing, CHEM 215 or EM 335 <input type="checkbox"/> C E 340: Principles of Env. Engineering Corequisite: CHE 322 or EM 335 <input type="checkbox"/> C E 443: Air Pollution Control Prerequisite: CHE 307 Corequisite: CHE 322 <input type="checkbox"/> C E 445: Hazardous Waste Treatment Prerequisite: CE 340
Engineering Elective	3	
Eng. or Science Elective	3	
TOTAL CREDITS	18	

Note:

- The instructors for these courses have indicated that upper-level CHE students may enroll in these courses without the prerequisites listed in the MSU Catalog.

## Materials Engineering Focus

Requirement	Credits	Options (where applicable)
M E 251: Matls Sci Lab	1	
E M 251: Stat & Part Dyn	3	
CHEM 325: P. Chem. Lab.	1	
CHEM 426: Spect Meth Ana	3	
Materials Eng. Elective <sup>2</sup>	6	<b>Choose Two:</b> <input type="checkbox"/> E M 253: Mechanics of Materials Prerequisite: EM 251 <input type="checkbox"/> CH E 452: Advanced Engineering Materials** Prerequisite: MATH 225 and ME 250 or CHE 213 <input type="checkbox"/> CH E 463: Composite Materials** Prerequisite: CHE 213 <input type="checkbox"/> CH E 467: Polymer Engineering** Prerequisite: CHE 213, CHE 215
Eng. or Science Elective <sup>2</sup>	4	
TOTAL CREDITS	18	

Note:

- 2 Your choice of Materials Engineering Electives, Engineering Electives, and Science Electives must include at least 1 credit of “advanced chemistry”. Upper level CHEM or BCHM courses count as “advanced chemistry”, and courses marked with (\*\*) in this list provide 1 credit of “advanced chemistry”. Other courses (mostly CHE elective courses) may also provide “advanced chemistry” credit. See the list of Technical Electives for more information.

# Chemical Engineering Technical Electives

Note: The Credits listed below are: Total Credits | AdChem Credits | EngSD Credits - (updated 6 / 2002)

Course #	Title	Offered	Credits	Notes
BCHM 340	General Biochemistry	[F, S, Su]	5   5   0	
CE 340	Environmental Engineering	[F, S]	3   0   3	
CE 434	Groundwater	[S]	3   0   3	
CE 443	Air Pollution Control	[F 2000]	3   0   3	
CE 444	Solid Waste Management	[F 2001]	3   0   3	
CE 445	Hazardous Waste Treatment	[S]	3   0   3	
CH E 338	Bioprocesses in Engineering	[S]	2   2   2	
CH E 402	Chemical Process Industries	[S]	3   1   3	
CH E 438	Bioprocess Engineering	[F]	2   1   2	
CH E 444	Hazardous Waste Management	[F]	3   0   3	
CH E 452	Advanced Engineering Materials	[S]	3   1   3	
CH E 463	Composite Materials	[F]	3   1   3	
CH E 467	Intro. to Polymer Engineering	[S 2001]	3   1   3	
CH E 415	Design Case Studies	[S]	2   0   2	Note 1
CH E 490	Undergraduate Thesis	[F,S,Su]	1 to 8   0   0	Note 1
CHEM 228	Analytical Chemistry	[S]	3   3   0	
CHEM 326	Physical Chemistry Laboratory II	[S]	2   2   1	
CHEM 334	Inorganic Chemistry	[S]	3   3   0	
CHEM 417	Synthetic Chemistry	[F]	3   3   0	
CHEM 425	Electrochemistry & Separations	[F]	3   3   0	
CHEM 426	Spectrochemical Analysis	[S]	3   3   0	
EE 206	Circuits & Electronics Fundamentals I	[F,Su]	4   0   4	
EE 207	Circuits & Electronics Fundamentals II	[F,S,Su]	4   0   4	
EE 216	Linear Electronics I	[F,S,Su]	4   0   4	
EM 251	Statics and Particle Dynamics	[F,S,Su]	3   0   3	
EM 252	Rigid Body Dynamics	[F,S]	3   0   3	
EM 253	Mechanics of Materials	[F,S,Su]	3   0   3	
I&ME 313	Work Analysis & Design	[S]	3   0   3	
I&ME 350	Applied Eng. Data Analysis	[F,S,Su]	2   0   0	
I&ME 354	Engineering Statistics I	[F]	3   0   0	
MB 301	General Microbiology I	[F]	4   4   0	
ME 255	Manufacturing Processes	[S]	3   0   3	
ME 355	Computer-Aided Manufacturing	[on demand]	3   0   3	
ME 450	Metallic Materials	[on demand]	3   1   3	
PHYS 213	General & Modern Physics III	[F,S]	4   4   0	
PHYS 231	Intro. to Theoretical Physics	[S]	3   3   0	
PHYS 425	Thermo. & Statistical Physics	[S 2001]	3   3   0	
PHYS 426	Modern Optics	[S 2002]	3   3   0	
PHYS 427	Laser Applications	[S 2001]	3   3   0	
PHYS 441	Solid State Physics	[F 2001]	3   3   0	

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## Notes

One of these courses (CHE 415, CHE 490) is required for graduation (student's choice). The other may be taken as a technical elective.