Sample Course Planning Guide

for

Bachelor of Science in Engineering (BSE) entered 2011 & 2012

41 CU TOTAL

### COURSE SELECTION

<table>
<thead>
<tr>
<th>COURSE SELECTION</th>
<th>MATH (4 CU)</th>
<th>ENGINEERING (15 CU)</th>
<th>TECH ELECTIVES (4 CU)</th>
<th>SSH (7 CU)</th>
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<tbody>
<tr>
<td>□ MATH 104</td>
<td>□ EAS 105</td>
<td>□ ENGINEERING&lt;sup&gt;d&lt;/sup&gt;</td>
<td>□ SS ___________</td>
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<tr>
<td>□ MATH 114</td>
<td>□ CBE 160</td>
<td>□ ____________________</td>
<td>□ SS ___________</td>
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<tr>
<td>□ MATH 240</td>
<td>□ CBE 230</td>
<td>□ ____________________</td>
<td>□ H ____________</td>
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<tr>
<td>□ MATH 241</td>
<td>□ CBE 231</td>
<td>□ CBE 480&lt;sup&gt;a&lt;/sup&gt; or CHEM 223 or CHEM 245</td>
<td>□ SS or H ___________</td>
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<tr>
<td></td>
<td>□ CBE 350</td>
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**NATURAL SCIENCE (8-9 CU)**

<table>
<thead>
<tr>
<th>NATURAL SCIENCE (8-9 CU)</th>
<th>□ CHEM 101&lt;sup&gt;a&lt;/sup&gt;</th>
<th>□ CBE 160</th>
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<tr>
<td>□ CHEM 053</td>
<td>□ CBE 351</td>
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<td>□ CHEM 102</td>
<td>□ CBE 353</td>
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<tr>
<td>□ PHYS 140 or PHYS 150&lt;sup&gt;b&lt;/sup&gt;</td>
<td>□ CBE 400</td>
<td>□ 150/151 exempts student 1 TECH ELEC</td>
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<tr>
<td>□ CHEM 221 or MSE 221</td>
<td>□ CBE 400</td>
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<td>□ CHEM 241</td>
<td>□ CBE 460</td>
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<tr>
<td>□ CHEM 242 or CHEM 251</td>
<td>□ CBE 451</td>
<td>□ _________________</td>
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**FREE ELECTIVES (3 CU)**

- □ CHEM 223 or MSE 221
- □ CBE 350
- □ CBE 351
- □ CBE 353
- □ CBE 371
- □ CBE 400
- □ CBE 410
- □ CBE 415
- □ CBE 450
- □ CBE 459
- □ CBE 460
- □ CBE 479
- □ CBE 480

**NOTES:**

- □ Depth (from SSH)
- □ Writing req't (from SSH)
- □ Please see *CHEM on reverse
- □ 150/151 exempts student 1 TECH ELEC
- □ CBE 300+ or ENM 510/ENM 511
- □ CBE 150 Recommended
- □ CBE 479 is pre-requisite
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### SEMESTER PLANNING

<table>
<thead>
<tr>
<th>TERM</th>
<th>MATH &amp; NAT SCI</th>
<th>ENGINEERING</th>
<th>COMP &amp; TECH ELEC'S</th>
<th>SSH &amp; FREE ELEC'S</th>
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<tbody>
<tr>
<td>Fall ___</td>
<td>MATH 104</td>
<td>CBE 160</td>
<td>tech elective (recommend CBE 150)</td>
<td>Free elective</td>
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<td>PHYS 140</td>
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<td>MATH 114</td>
<td>CBE 230</td>
<td>Writing requirement (SSH)</td>
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<td>CHEM 102 &amp; 054</td>
<td>PHYS 141</td>
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<td>CBE 231</td>
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<td>SSH elective</td>
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<td>CBE 350</td>
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<td>CHEM 241</td>
<td>CBE 351</td>
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<td>Spring __</td>
<td>CHEM 241</td>
<td>CBE 351</td>
<td>CBE 480 or CHEM 223 or CHEM 245</td>
<td>SSH elective</td>
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<td></td>
<td>CHEM 242 or 251</td>
<td>CBE 371</td>
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<td>Free elective</td>
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<td>CBE 410</td>
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<td>CBE 451</td>
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<td>Spring __</td>
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<td>CBE 460</td>
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<td>CBE 495</td>
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### CORE COURSE TITLES

- CBE 150 - Fund. of Biotechnology
- CBE 160 - Intro to Chemical Eng.
- CBE 230 - Mat. & Energy Balances
- CBE 231 - Therm. of Fluids
- CBE 350 - Fluid Mechanics
- CBE 371 - Separ. Processes
- CBE 400 - Intro to Product Design
- CBE 410 - Chem. Eng. Lab
- CBE 451 - Chem. Reac. Design
- CBE 479 - Biot. & Biochem. Eng
- CBE 480 - Lab in Biot. & Gen. E
- ENM 510/511 - Eng. Math I & II
Sample Course Planning Guide
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CONTINUED

OTHER COURSE TITLES

| CHEM 053 - Intro Chem Lab I | CHEM 242 - Principles of Orgo II | MATH 114 - Calculus II |
| CHEM 054 - Intro Chem Lab II | CHEM 245 - Experimental Orgo I | MATH 240 - Calculus III |
| CHEM 101 - General Chem I | CHEM 251 - Prin. of Biological Chemistry | MATH 241 - Calculus IV |
| CHEM 102 - General Chem II | CIS 110 - Intro. to Comp. Prog. (w/ Java) | PHYS 140 - Principles of Physics I |
| CHEM 221 - Physical Chemistry I | CIS 120 - Prog. Languages & Techniques | PHYS 141 - Principles of Physics II |
| CHEM 223 - Experimental P. Chem I | EAS 105 - Int. to Scientific Computing | PHYS 150 - " " " " with Lab |
| CHEM 241 - Principles of Orgo I | MATH 104 - Calculus I | PHYS 151 - " " " " with Lab |

THE WRITING REQUIREMENT

Students are strongly encouraged to fulfill the Writing Requirement during the first two years of study because it becomes increasingly difficult to schedule first-year courses as one moves through the curriculum.

The Writing Requirement differs somewhat between each of the four undergraduate schools at Penn. For Penn Engineering students, the requirement can be satisfied in one of the following ways:

1. **Any of the English Writing Seminars** 1-9, 12 or 125, satisfies the requirement. English 11 (Writing for International Students) may be used by international students for whom English is truly a second language. Engl 013 may be used by students who have transferred from another institution and who received Engl 013 transfer credit. Any of these courses may be used to satisfy a humanities requirement in the SSH category of either the BAS or BSE degree.

2. **Writing Seminars** are offered by the English Department as well as many other departments in Arts and Sciences. In addition, Penn Engineering offers EAS 009: Writing About Science and Engineering.

3. **MGMT 250: “The Language of Leadership”** may be taken to satisfy the Writing Requirement.

Note: Students may not use A.P. credit to satisfy the writing requirement. Courses used to satisfy the writing requirement may be taken pass/fail.

SOCIAL SCIENCE AND HUMANITIES COURSES

The depth requirement: a student should choose courses of personal interest which will provide in-depth study (two or more courses) of at least one subject in any SSH category.

Approved Social Science (SS) Departments:


Approved SS Courses Offered outside of SAS:

CIS 355, 590; EAS/BE 303; LGST 101, 210; FNCE 101, 103; BPUB 201, 250; NURS 333, 533

Approved Humanities (H) Departments and Courses:


Approved Substitutions:

Up to two SSH courses may be substituted from the "Technology in Business and Society" course category.

These are limited to: BE 280, 503; CIS 125, 355, 590; EAS 9, 125, 280, 345, 346, 348, 349, 400, 401, 402, 445, 446, 448, 449, 500, 502, 548; IPD 549, MEAM 399, and MEE 266.

TECH ELECTIVES

Any of the following may be used:

- ASTR 11, 12, 111, 250, 390, 410, 411, 412
- BCHE
- BE 305, 505, 513
- BBIB except 227; BIOL 91, 92, 100+
- CHEM any except 11, 12, 22, 12; CIS 260, 261, 262, 313
- EAS 205, 210, 401, 520
- ENM
- ESE 301, 302
- GCB
- GEOL 109, 130, 200+
- MATH any above 104 except 122, 123, 130, 150, 151, 170, 174, 201, 220, 475
- MEAM 110, 147
- MEE 251, 252, 260, 330, 422, 430
- PHIL 5, 6
- PHYS 50, 51, 93, 94, 140, 141, 150+ except 500; STAT 430, 431

Any SEAS course EXCEPT the following may be used: Any 296, 297; BE 280, 303, 503; EAS 9, 2x, 97, 125, 200, 280, 281, 282, 285, 303, 310, 320, 345, 346, 348, 349, 400, 402, 445, 446, 448, 449, 500, 502, 545, 546, 547, 548, 623; CIS 100, 101, 106, 125, 355, 590; MEAM 399; MEE 266, 268, 368.

* CHEM continued from front: CHEM 091 is acceptable in this department, but it is not equivalent to CHEM 101. Therefore, pre-med students or students who might transfer out of CBE will still need CHEM 101 credit. We highly recommend taking the placement test regardless.

1unless cross-listed w/AMES, ENGL, FNAR, HIST, or SAST; 2except stats., probability, & math courses; 3except language courses
4Design of the Environment; 5cross-listed with AMES, ENGL, FNAR, HIST, or SAST only; 6except logic courses 005 & 006