## Course Planning Guide

for

Bachelor of Science in Engineering (BSE) entered 2013 or later

### COURSE SELECTION

<table>
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<tr>
<th>MATH (4 CU)</th>
<th>ENGINEERING (15 CU)</th>
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<tr>
<td>□ MATH 104</td>
<td>□ EAS 105</td>
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<td>□ MATH 114</td>
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**NATURAL SCIENCE (8-9 CU)**

| CHEM 101<sup>a</sup> | □ CBE 351 |
| CHEM 102             | □ CBE 400 |
| CHEM 053             | □ CBE 400 |
| CHEM 054             | □ CBE 410 |
| PHYS 140 or PHYS 150<sup>b</sup> | □ CBE 451 |
| PHYS 141 or PHYS 151<sup>b</sup> | □ CBE 459 |
| CHEM 221 or MSE 221  | □ CBE 460 |
| CHEM 241             | □ CBE _______<sup>c</sup> |
| CHEM 242 or CHEM 251 | □ CBE _______<sup>c</sup> |

**MATH (4 CU)**

| □ MATH 104 |
| □ MATH 114 |
| □ MATH 240 |
| □ MATH 241 |

**ENGINEERING (15 CU)**

| □ EAS 105 |
| □ CBE 160 |
| □ CBE 230 |
| □ CBE 231 |
| □ CBE 350 |

**TECH ELECTIVES (4 CU)**

| □ □ CBE 480<sup>b</sup> or CHEM 223 or CHEM 245 |
| □ □ SS or H |

**SSH (7 CU)**

| □ □ SS |
| □ □ H |

### NOTES:

- □ Depth (from SSH)
- □ Writing req’t (from SSH)
- □ Ethics req’t/ EAS 203
- □ 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

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<th>TERM</th>
<th>MATH &amp; NAT SCI</th>
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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 - Thermod. 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
### 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:
- Asian American Studies
- Communications, Criminology
- Economics
- GSOC, Health and Societies
- International Relations
- Linguistics
- PP&E, Political Science
- Psychology
- Sociology
- Science Technology and Society
- Urban Studies
- Women's Studies

#### Approved SS Courses Offered outside of SAS:
- CIS 355, 590; EAS/BE 303; LGST 101, 210; FNCE 101, 103; BIPUB 201, 250; NURS 333, 533

#### Approved Humanities (H) Departments and Courses:
- African Studies
- Africana Studies
- Anthropology
- Ancient History
- Architecture
- Art and Archeology of the Mediterranean World
- Art History
- Asian American Studies
- Cinema Studies
- Classical Studies
- Comparative Literature
- Literary Theory
- East Asia Languages and Civilizations
- English Fine Arts
- Folklore
- Germanic Languages
- History
- History and Sociology of Science
- IPD
- Jewish Studies
- Latin American and Latino Studies
- Music
- Near Eastern Languages & Civilizations
- Philosophy
- Religious Studies
- Romance Languages
- Slavic Languages
- South Asia Studies
- Theatre Arts

Additionally, any foreign language course and any of the following courses will fulfill this requirement: CIS 106; EAS 009, 200, 310.

#### 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 MSE 266.

### TECH ELECTIVES

Any of the following may be used: ASTR 11, 12, 111, 250, 390, 410, 411, 412; CHEM; BE 305, 505, 513; GBBB except 227; BIOL 91, 92, 100+ except 130, 446, 544; CAMB; 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 except 104 except 122, 123, 130, 150, 151, 170, 174, 180, 212, 220, 475; MEAM 110, 147; MSE 215, 221, 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; MSE 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.

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