

# Sample Course Planning Guide

for

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

41 CU TOTAL

COURSE SELECTION			
MATH (4 CU)	ENGINEERING (15 CU)	TECH ELECTIVES (4 CU)	SSH (7 CU)
<input type="checkbox"/> MATH 104 <input type="checkbox"/> MATH 114 <input type="checkbox"/> MATH 240 <input type="checkbox"/> MATH 241	<input type="checkbox"/> EAS 105 <input type="checkbox"/> CBE 160 <input type="checkbox"/> CBE 230 <input type="checkbox"/> CBE 231 <input type="checkbox"/> CBE 350 <input type="checkbox"/> CBE 351 <input type="checkbox"/> CBE 353 <input type="checkbox"/> CBE 371 <input type="checkbox"/> CBE 400 <input type="checkbox"/> CBE 410 <input type="checkbox"/> CBE 451 <input type="checkbox"/> CBE 459 <input type="checkbox"/> CBE 460 <input type="checkbox"/> CBE _____ <sup>c</sup> <input type="checkbox"/> CBE _____ <sup>c</sup>	<input type="checkbox"/> ENGINEERING <sup>d</sup> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> CBE 480 <sup>e</sup> or CHEM 223 or CHEM 245	<input type="checkbox"/> SS _____ <input type="checkbox"/> SS _____ <input type="checkbox"/> H _____ <input type="checkbox"/> H _____ <input type="checkbox"/> SS or H _____ <input type="checkbox"/> SS or H or TBS _____ <input type="checkbox"/> SS or H or TBS _____
<b>NATURAL SCIENCE (8-9 CU)</b>			
<input type="checkbox"/> CHEM 101 <sup>a</sup> <input type="checkbox"/> CHEM 053 <input type="checkbox"/> CHEM 102 <input type="checkbox"/> CHEM 054 <input type="checkbox"/> PHYS 140 or PHYS 150 <sup>b</sup> <input type="checkbox"/> PHYS 141 or PHYS 151 <sup>b</sup> <input type="checkbox"/> CHEM 221 or MSE 221 <input type="checkbox"/> CHEM 241 <input type="checkbox"/> CHEM 242 or CHEM 251			
		<b>NOTES:</b>	<input type="checkbox"/> <b>Depth</b> (from SSH)
		<sup>a</sup> Please see * CHEM on reverse	<input type="checkbox"/> <b>Writing req't</b> (from SSH)
		<sup>b</sup> 150/151 exempts student 1 TECH ELEC	
		<sup>c</sup> CBE 300+ or ENM 510/ENM 511	<b>FREE ELECTIVES (3 CU)</b>
		<sup>d</sup> CBE 150 Recommended	<input type="checkbox"/> _____
		<sup>e</sup> CBE 479 is pre-requisite	<input type="checkbox"/> _____
			<input type="checkbox"/> _____

SEMESTER PLANNING				
TERM	MATH & NAT SCI	ENGINEERING	COMP & TECH ELEC'S	SSH & FREE ELEC'S
Fall ____	MATH 104 CHEM 101 & 053 PHYS 140		tech elective (recommend CBE 150)	Free elective
Spring ____	MATH 114 CHEM 102 & 054 PHYS 141	CBE 160		Writing requirement (SSH)
Summer ____				
Fall ____	MATH 240 CHEM 241	CBE 230		SSH elective Free elective
Spring ____	MATH 241 CHEM 242 or 251	CBE 231	EAS 105	SSH elective
Summer ____				
Fall ____	CHEM 221 or MSE 221	CBE 350 CBE 353 CBE elective		SSH elective
Spring ____		CBE 351 CBE 371	CBE 480 or CHEM 223 or CHEM 245	SSH elective Free elective
Summer ____				
Fall ____		CBE 400 CBE 410 CBE 451	tech elective	SSH elective
Spring ____		CBE 460 CBE 459 CBE elective	tech elective	SSH elective
Summer ____				

CORE COURSE TITLES			
CBE 150 - Fund. of Biotechnology	CBE 350 - Fluid Mechanics	CBE 400 - Intro to Product Design	CBE 460 - Chem. Proc. Ctrl.
CBE 160 - Intro to Chemical Eng.	CBE 351 - Heat & Mass Trans.	CBE 410 - Chem. Eng. Lab	CBE 479 - Biot. & Biochem. Eng
CBE 230 - Mat. & Energy Balances	CBE 353 - Adv. Chem. Eng. Sci	CBE 451 - Chem. React. Design	CBE 480 - Lab in Biot. & Gen. E
CBE 231 - Thermod. of Fluids	CBE 371 - Separ. Processes	CBE 459 - Process Sys. Design Prjcs.	ENM 510/511 - Eng. Math I & II

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## Bachelor of Science in Engineering (BSE)

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 - Intro. 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:

Asian American Studies<sup>1</sup>, Communications, Criminology, Economics<sup>2</sup>, GSOC, Health and Societies, International Relations, Linguistics<sup>3</sup>, PP&E, Political Science, Psychology<sup>2</sup>, Sociology<sup>2</sup>, 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; BPUB 201, 250; NURS 333, 533

#### Approved Humanities (H) Departments and Courses:

African Studies, Africana Studies, Anthropology, Ancient History, Architecture<sup>4</sup>, Art and Archeology of the Mediterranean World, Art History, Asian American Studies<sup>5</sup>, Cinema Studies, Classical Studies, Comparative Literature and 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<sup>6</sup>, 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; BCHE; BE 305, 505, 513; BBIB **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 any above 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.

<sup>1</sup>unless cross-listed w/AMES, ENGL, FNAR, HIST, or SAS; <sup>2</sup>except stats., probability, & math courses; <sup>3</sup>except language courses

<sup>4</sup>Design of the Environment; <sup>5</sup>cross-listed with AMES, ENGL, FNAR, HIST, or SAS **only**; <sup>6</sup>except logic courses 005 & 006