

This course program is based on course times offered in recent years. However course times may change.					
<i>This course program is only recommended for students who come in with strong interest in Chemical Engineering, and assumes Math 118 placement or higher</i>					
There is very little space in this program for taking courses to explore interests outside of Chemistry and Chemical Engineering. This program may not be for those who wish a broad liberal arts education or who wish to satisfy pre-medical requirements.					
* - Asterisk indicates that there are other times that these courses could be taken					
<b>Note: DIST REQ indicates slots for taking 3 HUM and 3 SOC courses, with no more than 2 courses in any one department. It is recommended a course or two in Economics be included among the SOC courses.</b>					
Semester	Course Num	Course Name	Course Loc	Course Time	Other Alternatives
1A	Chem 111	Chemical Structure and Bonding	HC	MWF 9:30-10:30*; Tu 9-10 recit*; Th 1-4 lab*	
1A	LANGUAGE		HC		Physics may be taken first year instead of
1A	WRPR ???	Writing Seminar	HC		language, or instead of math if math placement
1A	Math 118	Calculus II	HC	MWF 10:30-11:30	is at level of Math 121 or higher.
1B	Chem 112	Chemical Dynamics	HC	MWF 9:30-10:30*; Tu 9-10 recit*; Th 1-4 lab*	
1B	MATH 121	Calculus III	HC	MWF 10:30-11:30	
1B	DIST REQ	(dist req)	HC or BMC		
1B	LANGUAGE		HC		
2A	Physics 101/105	Physics I	HC	MWF 11:30-12:30*; W 1-4 lab*	If Physics was taken in the first year instead of language, then take language second year.
2A	Chem 222	Bioorg Chem	HC	MWF 9:30-10:30; M 1-4 lab*	
2A	Chem 304	P Chem (Thermo)	HC	TuTh 8:30-10	Possibly can take Chem 222 at Bryn Mawr 2nd semester instead (taught MW 2:30-4:00)
2A	DIST REQ	(dist req)	HC or BMC		
2B	Physics 102/106	Physics II	HC	MWF 11:30-12:30*; W 1-4 lab*	
2B	Chem 225	Org Synth	HC	MWF 9:30-10:30; M 1-4 lab*	
2B	DIST REQ	(dist req)	HC or BMC		
2B	Adv. Math	Linear Algebra or Differential Equations	HC or BMC	various; for instance BMC Lin Alg TuTh 11:15-12:45	Recommended but not required. 200-level Diff. Eq. is only offered at BMC. For timing, earlier is better but can be swapped with later DIST REQ course.
<b>Students who are sure they wish to pursue Chemical Engineering may apply to the 4+1 program starting in March of their sophomore year</b>					
3A	CBE 350	Fluid Mechanics	UPenn	MWF 1-2; recit W 12-1	<i>Possible alternative to this course is MEAM 302: MWF 11-12; recit Tu 11-12 or Th 1:30-2:30. Note: Haverford students with Chem 304 background have succeeded in CBE 350 without having first taken CBE 231 (which is formally a prerequisite for CBE 350).</i>
3A	CHEM 301	Superlab I	HC	TuTh 11:30-4:00	
3A	DIST REQ	(dist req)	HC or BMC		
3A	DIST REQ	(dist req)	HC or BMC		

Semester	Course Num	Course Name	Course Loc	Course Time	Other Alternatives
3B	CBE 231	Thermodynamics of Fluids	UPenn	MWF 10-11, recit R 1:30 or 3:30	Is prerequisite for most higher numbered CBE courses. Possible alternative course is Swarthmore's ENGR 041 offered every other (even numbered) fall MWF 8:30+lab and prob sessions M&W afternoon
3B	CBE 351	Heat and Mass Transport	UPenn	MWF 2-3; recit M 3-4	Equivalent to MEAM 333: TuTh 3-4:30; recit 11-12 or 2-3
3B	Chem 305	Quantum Chemistry	HC	TuTh 10-11:30	Optional, in order to complete an ACS Certified Chemistry Degree
3B	DIST REQ	(dist req)	HC or BMC		
<b>Students must apply to the 4+1 program no later than March of their junior year, and must be admitted to the program to take more than 3 or 4 courses at U Penn while matriculated at Haverford.</b>					
4A	CBE 371	Separation Processes	UPenn	TuTh 9-10:30	
4A	CBE 451	Chem Reactor Design	UPenn	TuTh 10:30-noon; recit W 5-6	
4A	Elective	Elective	HC or BMC		
4A	CHEM 36x	Research	HC		Only one semester. To get additional research experience, students may apply for summer research positions before junior and/or senior year.
4A	CHEM 391	Senior Seminar	HC	F 3-4	half credit course over whole year
4B	CBE ???	(Grad Course)	UPenn		Consult with U Penn Engineering faculty to select appropriate courses. Grad courses change from year to year.
4B	CBE ???	(Grad Course)	UPenn		
4B	Chem 302	Superlab	HC	TuTh 11:30-4:00	Required for Chemistry major.
4B	Chem 320/35x	Inorganic	HC	MWF 9:30-10:30	
4B	CHEM 391	Senior Seminar	HC	F 3-4	half credit course over whole year
<b>Fifth year (as student matriculated at U. Penn): Eight additional graduate-level courses (10 total) are required for the Master's Degree in Chemical and Biochemical Engineering at U Penn. See their website for more details.</b>					