Sample schedule for ChemE/BME Additional Majors in the CMBT Track

Updated 7/19/2019

Chemical Engineering

First Year

	Fall	Units
21-120	Differential & Integral Calculus	10
76-xxx	Designated Writing Course	9
99-101	Computing@Carnegie Mellon	3
06-100	Introduction to Chemical Engineering	12
09-105	Introduction to Modern Chemistry I	10
	Total:	**44**

	Spring	Units
21-122	Integration & Approximation	10
xx-xxx	Intro. to Engineering Course	12
33-141	Physics I for Engineering Students	12
xx-xxx	General Education Course	9
	Total:	**43**

Second Year

	Fall	Units
06-222	Sophomore Chemical Engineering Seminar	1
21-259	Calculus in Three Dimensions	9
06-221	Thermodynamics	9
09-106	Modern Chemistry II	10
xx-xxx	Computer Sci./Physics II	10-12
xx-xxx	General Education Course	9
39-210	Experiential Learning I	0
	Total:	**48-50**

	Spring	Units
06-261	Fluid Mechanics	9
06-262	Math: Methods of Chem. Engineering	12
09-221	Lab I: Introduction to Chemical Analysis	12
xx-xxx	Computer Sci./Physics II	10-12
xx-xxx	General Education Course	9
39-220	Experiential Learning II	0
	Total:	**52-54**

Third Year

	Fall	Units
06-321	Chemical Engineering Thermodynamics	9
06-322	Junior ChemE Seminar	2
06-323	Heat and Mass Transfer	9
09-217 or 09-219	Organic Chemistry I	9
09-347	Advanced Physical Chemistry	12
xx-xxx	General Education Course	9
39-310	Experiential Learning III	0
	Total:	**50**

	Spring	Units
06-361	Unit Operations of ChemE	9
06-363	Transport Process Laboratory	9
06-364	Chemical Reaction Engineering	9
03-232	Biochemistry	9
xx-xxx	Unrestricted Elective	9
xx-xxx	General Education Course	9
	Total:	**54**

Chemical Engineering and BME

First Year

	Fall	Units
21-120	Differential & Integral Calculus	10
76-xxx	Designated Writing Course	9
99-101	Computing@Carnegie Mellon	3
06-100	Intro to Chemical Engineering	12
09-105	Modern Chemistry	10
	Total:	**44**

	Spring	Units
21-122	Integration & Approximation	10
42-101	**Intro to Biomedical Engineering**	**12**
33-141	Physics I for Engineering Students	12
03-121	**Modern Biology**	**9**
xx-xxx	General Education Course	9
	Total:	**52**

Second Year

	Fall	Units
06-222	Sophomore ChemE Seminar	1
21-259	Calculus in Three Dimensions	9
06-221	Thermodynamics	9
09-106	Modern Chemistry II	10
xx-xxx	Computer Sci./Physics II	10-12
42-202	**Physiology**	**9**
-or-		
42-203	**BME Laboratory**	
39-210	Experiential Learning I	0
	Total:	**48-50**

	Spring	Units
06-261	Fluid Mechanics	9
06-262	Math: Methods of Chem. Engineering	12
09-221	Lab I: Introduction to Chemical Analysis	12
xx-xxx	Computer Sci./Physics II	10-12
42-201	**Professional Issues in BME**	**3**
42-202	**Physiology**	**9**
-or-		
42-203	**BME Laboratory**	
39-220	Experiential Learning II	0
	Total:	**55-57**

Third Year

	Fall	Units
06-321	Chemical Engineering Thermodynamics	9
06-323	Heat and Mass Transfer	9
09-217 or 09-219	Organic Chemistry I	9
09-347	Advanced Physical Chemistry	12
xx-xxx	General Education Course	9
42-XXX	**CMBT Track Elective OR 42-302 Biomedical Engineering Systems Modeling and Analysis**	**9**
39-310	Experiential Learning III	0
	Total:	**57**

	Spring	Units
06-361	Unit Operations of ChemE	9
06-363	Transport Process Laboratory	9
06-364	Chemical Reaction Engineering	9
03-232	Biochemistry	9
42-XXX	**CMBT Track Elective OR 42-302 Biomedical Engineering Systems Modeling and Analysis**	**9**
xx-xxx	General Education Course	9
	Total:	**54**

Fourth Year

	Fall	Units
06-421	Chemical Process System Design	12
06-423	Unit Operations Laboratory	9
xx-xxx	Unrestricted Elective	9
xx-xxx	Unrestricted Elective	9
xx-xxx	General Education Course	9
	Total:	**48**

	Spring	Units
06-462	Optimization Modeling and Algorithms	6
06-463	Chemical Product Design	6
06-464	Chemical Engineering Process Control	9
xx-xxx	Unrestricted Elective	9
xx-xxx	Unrestricted Elective	9
xx-xxx	General Education Course	9
	Total:	**48**

Fourth Year

	Fall	Units
06-421	Chemical Process System Design	12
06-423	Unit Operations Laboratory	9
42-401	**Foundations of BME Design**	**6**
42-XXX	**CMBT Track Elective**	**9**
xx-xxx	General Education Course	9
xx-xxx	General Education Course	9
	Total:	**54**

	Spring	Units
06-462	Optimization Modeling and Algorithms	6
06-463	Chemical Product Design	6
06-464	Chemical Engineering Process Control	9
42-402	**BME Design**	**9**
xx-xxx	**CMBT Track Elective**	**9**
xx-xxx	General Education Course	9
xx-xxx	General Education Course	9
	Total:	**57**

Minimum no. of units to graduate: 389 (ChemE), 421 (BME/ChemE)

Core courses (All Required)
42-101 Introduction to Biomedical Engineering - Fall and Spring
42-201 Professional Issues in Biomedical Engineering - Fall and Spring
42-202 Physiology - Fall and Spring
42-203 Biomedical Engineering Laboratory# - Fall and Spring
42-302 Biomedical Engineering Systems Modeling and Analysis – Fall and Spring
03-121 Modern Biology - Fall and Spring
42-401 Foundations of BME Design* - Fall
42-402 BME Design – Spring

Also known as 03-206 for pre-med students.
*42-401 serves as the precursor/pre-requisite for 42-402 BME Design.

Students must fulfill the following CMBT track requirements.

- One (1) **Required** CMBT Elective
- Two (2) CMBT Electives (either **Required** or **Additional**)

Required CMBT Electives (must take at least one of the following)
42-620 Engineering Molecular Cell Biology
42-623 Cellular and Molecular Biotechnology
42-624 Biological Transport and Drug Delivery

Additional CMBT Electives
03-240 Cell Biology
42-622/06-622 Bioprocess Design
42-643/24-615/06-623 Microfluidics
42-645/24-655 Cellular Biomechanics
42-646/06-646/24-657 Molecular Biomechanics
42-673 Stem Cell Engineering
42-676 Bio-nanotechnology: Principles and Applications
42-X00 BME Research* OR 39-500 CIT Honors Thesis* OR 42-6XX Clinical Course (Surgery for Engineers/ Precision Medicine/ICU Medicine)

* The 42-X00 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 Honors Research Project) must be on a BME topic that is aligned to the track, supervised or co-supervised by a BME faculty member, and conducted for 9 or more units of credits.

Some Special Topics and newly offered or intermittently offered courses may be acceptable as BMTE track electives. Students should consult with their Biomedical Engineering advisors and petition the Biomedical Engineering Undergraduate Affairs Committee for permission to include such courses as CMBT track electives.