# Sample schedule for ChemE/BME Additional Majors in the BMTE Track Updated 7/19/19

Fail	Chemical Engineering First Year				Chemical Engineering and BME First Year			
99-101   Computing@Camegie Mellon   3   99-101   Computing@Camegie Mellon   1   10   10   10   10   10   10   10		Differential & Integral Calculus		10		Differential & Integral Calculus		10
	09-105	Introduction to Modern Chemistry I			09-105	Modern Chemistry		
		To	otal:	44			Total:	44
Intro. to Engineering Course   12   42-101   Intro Delicomodical Engineering Students   12   33-141   Physics I for Engineering Students   12   33-141   Physics I for Engineering Students   12   33-141   Physics I for Engineering Students   19   9   9   10   10   10   10   10		Spring		Units				Units
13-31-41   Physics I for Engineering Students   12   33-141   Physics I for Engineering Students   12   33-141   Physics I for Engineering Students   19   35-241   Physics I for Engineering Students   19   35								
Second   S								
Second   Fall   Second   Fa		, ,						
Second   Fall		_			XX-XXX			
Second   Fall   Second   Fall   Second   Secon		To	otal:	43		·	Total:	52
Fall	Socond V	(nar			Second Y	'ear		
Section   Calculus in Three Dimensions   9   21-259   Calculus in Three Dimensions   9   9   9   9   9   9   9   9   9	Second 1			Units	00.000			
Section   Three Orline Source   Section   Three Orline Source   Section   Three Orline Source   Section   Three Orline Source   Section   Sectio			ar					
Modern Chemistry     10   10   10   10   10   10   10								
Name		•			09-106	Modern Chemistry II		
Saperal   Sape								
Total:   AB-50   Spring   Sp						riiysiology		9
Spring	39-210	Experiential Learning I		0				
Spring   Units   Spring   Units   Spring   Units   Spring   Units   Spring   Units   Spring   Sprin		To	otal:	48-50	39-210		otal	
66-261   Fluid Mechanics         9   06-261   Fluid Mechanics         9   06-262   Math: Methods of Chem. Engineering         12   09-221   Lab I: Introduction to Chemical Analysis         12   09-221   Lab I: Introduction to Chemical Analysis <t< td=""><td></td><td></td><td></td><td></td><td></td><td>•</td><td>otai.</td><td>40-30</td></t<>						•	otai.	40-30
Math: Methods of Chem. Engineering	00 004				00 004			
1								
Separation   Sep								
Second Process From Process Laboratory   Second Process		•						
Third Year  Third Year  Third Year  Fall  Units  6-321  Chemical Engineering Thermodynamics  6-322  Junior ChemE Seminar  6-323  Heat and Mass Transfer  6-324  Unit Organic Chemistry  Organic Chemistry I  Organic Chemis								
Third Year  Fall  One September 1 Chemical Engineering Thermodynamics September 2 Chemical Engineering Thermodynamics September 3 Chemical Engineering September 3 Chemical Engineer	00 220	Exponential Edulining II		Ü		. Hydididgy		Ū
Third Year Fall O6-321 Chemical Engineering Thermodynamics O6-322 Junior ChemE Seminar O9-217 Organic Chemistry I O7-217 Organic Chemistry I O7-218 Organic Chemistry I O7-219 Organic Chemistry I O7-210 Organic								0
Third Year		To	otal:	52-54	39-220	•	Total:	
Fall   Units   Fall   Units   O6-321   Chemical Engineering Thermodynamics   9   O6-323   Heat and Mass Transfer   9   O6-323   Heat and Mass Transfer   9   O7-219   O7-217   O7-219								
Fall   Units   O6-321   Chemical Engineering Thermodynamics   9   O6-321   Chemical Engineering Thermodynamics   9   O6-322   Unitor ChemE Seminar   2   O9-217   Organic Chemistry   Or	Third Voor				Third Yea			Unite
Chemical Engineering Thermodynamics   9   06-323   Heat and Mass Transfer   9   06-322   Junior ChemE Seminar   2   09-217   Organic Chemistry I   9   Organic Chemistry I   9   Organic Chemistry I   12   Organic Chemistry I   Organic Chemi	IIIII I Ed			Units	06-321			
Heat and Mass Transfer   9   Or 09-219   Organic Chemistry   12   Org					06-323			9
09-217 or 09-219 Organic Chemistry I 9 09-347 Advanced Physical Chemistry I 12 General Education Course 9 9 09-347 Advanced Physical Chemistry 12 BMTE Track Elective OR 42-302 Biomedical xx-xxx General Education Course 9 42-XXX Engineering Systems Modeling and 9 43-310 Experiential Learning III 0 Analysis						Organic Chemistry I		9
or 09-219 Organic Chemistry I 9 xx-xxx General Education Course 9 09-347 Advanced Physical Chemistry 12 BMTE Track Elective OR 42-302 Biomedical xx-xxx General Education Course 9 42-XXX Engineering Systems Modeling and Analysis  Total: 50 39-310 Experiential Learning III 0  Spring Units Spring Units Off-361 Unit Operations of ChemE 9 06-363 Transport Process Laboratory 9 06-364 Chemical Reaction Engineering 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 04-364 Chemical Education Course 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0								12
XX-XXX General Education Course Experiential Learning III 0 0 Analysis  Total: 50 39-310 Experiential Learning III 0 Total: 57  Total: 50 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 09 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 042-XXX Engineering Systems Modeling and Analysis 10 Analysis 1		·			XX-XXX	General Education Course		9
39-310 Experiential Learning III 0 39-310 Experiential Learning III 0 Total: 50 39-310 Experiential Learning III 0 Total: 57  Spring Unit Operations of ChemE 9 06-361 Unit Operations of ChemE 9 06-363 Transport Process Laboratory 9 06-364 Chemical Reaction Engineering 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 War-xxxx Unrestricted Elective  9  42-XXX Engineering Systems Modeling and Analysis General Education Course 7					42 VVV		edical	٥
Total: 50 39-310 Experiential Learning III 0 Total: 57  Spring Units  O6-361 Unit Operations of ChemE  06-363 Transport Process Laboratory  06-364 Chemical Reaction Engineering  03-232 Biochemistry  03-232 Biochemistry  03-232 Biochemistry  04-342-XXX Unrestricted Elective  xx-xxx Unrestricted Elective  xx-xxx General Education Course  Total: 54 XX-XXX General Education Course  Description  Spring Units  O6-361 Unit Operations of ChemE  9 06-363 Transport Process Laboratory  9 06-364 Chemical Reaction Engineering  9 03-232 Biochemistry  9 03-232 Biochemistry  9 BMTE Track Elective OR 42-302 Biomedical  8 Pagineering Systems Modeling and  9 Analysis  Total: 54 XX-XXX General Education Course					42-777			9
Spring Units 06-361 Unit Operations of ChemE 9 06-363 Transport Process Laboratory 9 06-364 Chemical Reaction Engineering 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 06-364 Chemical Reaction Engineering 9 03-232 Biochemistry 9 03-232 Biochemistry 9 05-364 Chemical Reaction Engineering 9 03-232 Biochemistry 9 03-232 Engineering Systems Modeling and 9 Analysis 9 05-364 Chemical Reaction Course 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Engineering Systems Modeling and 9 Analysis 9 05-364 Chemical Reaction Course 9 05-264 Chemical Reaction Course 9 05-264 Chemical Reaction Engineering 9 05-264 Chemical React			otal:	50	39-310			
Spring Unit Operations of ChemE 9 06-361 Unit Operations of ChemE 9 06-363 Transport Process Laboratory 9 06-363 Transport Process Laboratory 9 06-364 Chemical Reaction Engineering 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Unit Operations of ChemE 9 06-363 Transport Process Laboratory 9 06-364 Chemical Reaction Engineering 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 03-232 Engineering Systems Modeling and 9 03-232 Engineering Systems Modeling and 9 03-232 Engineering Systems Modeling and 9 042-XXX Engineering Systems Modeling Analysis							Total:	57
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06-363 Transport Process Laboratory 06-364 Chemical Reaction Engineering 03-232 Biochemistry xx-xxx Unrestricted Elective xx-xxx General Education Course  Total: 54 Chemical Reaction Engineering 9 06-364 Chemical Reaction Engineering 9 03-232 Biochemistry 9 06-364 Chemical Reaction Engineering 9 03-232 Biochemistry 9 08-364 Chemical Reaction Engineering 9 08-364 Chem		Spring		Units				
06-364 Chemical Reaction Engineering 03-232 Biochemistry xx-xxx Unrestricted Elective xx-xxx General Education Course  Total: 54 Sxx-xxx Biochemistry 9 03-232 Biochemistry 9 03-232 Biochemistry 9 BMTE Track Elective OR 42-302 Biomedical Engineering Systems Modeling and Analysis General Education Course 9						·		
03-232 Biochemistry 9 42-XXX Engineering Systems Modeling and 9 Xx-xxx General Education Course 9 Total: 54 Xx-xxx General Education Course 9		·						
xx-xxx Unrestricted Elective 9 42-XXX Engineering Systems Modeling and 9 42-XXX General Education Course 9 Analysis  Total: 54 XX-XXX General Education Course 9						BMTE Track Elective OR 42-302 Biome	edical	_
Total: 54 xx-xxx General Education Course 9	XX-XXX	Unrestricted Elective		9	42-XXX			9
	XX-XXX		otal:		XX-XXX			9
							Total:	54

Fourth Y	'ear		Fourth Year				
06-421 06-423 xx-xxx xx-xxx xx-xxx	Fall Chemical Process System Design Unit Operations Laboratory Unrestricted Elective Unrestricted Elective General Education Course	Total:	9 9 9 9 9	06-421 06-423 <b>42-401</b> <b>42-XXX</b> XX-XXX	Fall Chemical Process System Design Unit Operations Laboratory Foundations of BME Design BMTE Track Elective General Education Course General Education Course	Total:	Units 12 9 6 9 9 9 54
06-462 06-463 06-464 xx-xxx xx-xxx xx-xxx	Spring Optimization Modeling and Algorithms Chemical Product Design Chemical Engineering Process Control Unrestricted Elective Unrestricted Elective General Education Course	Total:	Units 6 6 9 9 9 48	06-462 06-463 06-464 <b>42-402</b> <b>xx-xxx</b> xx-xxx	Spring Optimization Modeling and Algorithms Chemical Product Design Chemical Engineering Process Control BME Design BMTE Track Elective General Education Course General Education Course	Total:	Units 6 9 9 9 9 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 Project- 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 BMTE track requirements.

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

### Required BMTE Electives (must take at least one of the following)

42-411/27-411 Engineering Biomaterials

42-612/27-520 Tissue Engineering

42-670 Biomaterial Host Interactions in Regenerative Medicine

## **Additional BMTE Electives**

03-320 Cell Biology

42-613/27-570 Polymeric Biomaterials

42-620 Engineering Molecular Cell Biology

42-624 Biological Transport and Drug Delivery

42-643/24-615/06-623 Microfluidics

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)

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 BMTE track electives.

<sup>\*</sup> 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 credit.