

# MBB revision 2016

Ver 5.1

This has been approved by a committee with representation from Biology, Chemistry and Physics, including the chairs of each department.

It was also approved by the Biology faculty, the department in which the MBB degree resides, on 6<sup>th</sup> Oct 2016

Revision version notes:

- The MBB electives have been reduced in number from 3 to 2, but the choice of classes fulfilling this category has been narrowed to include more tightly “biophysics” content.
- MATH252 has been returned to required category, from the MBB elective category.

## Rationale

The main problems with MBB as it stands are:

- The degree is very inflexible making hard to administer, and also difficult for the students to meet all requirements.
- MBB is a modest enrollment degree program (7 majors currently). This becomes a problem when specific courses are required for this major but no others, and can result in unsustainably low enrollment in those courses. Currently this is the situation for one such required class, PHYS410.
- MBB was developed as a premed degree when Biology, Chemistry and Physics were combined together as the BCPS department. Several Biology faculty taught this class at that time; but since the split into individual departments, Physics has taken over scheduling and teaching PHYS410. This has complicated the low enrollment situation, as this class is rarely if ever taken by PHYS majors.
- This degree is attractive as a marquee degree. Historically a high proportion of life science focused CAMRAS applicants have applied to this program. If we can make it more viable it could be a modest growth area – especially in terms of student quality. But many students do not know what it is; and others are disappointed at the lack of biophysics content and transfer to other technical degrees (ENG, mostly BME; or BCHM)

## Proposal

The proposal is to revise the degree to both create more flexibility and to increase the biophysics content that attracted the students in the first place. These changes are credit hour neutral. Additionally, MBB currently has only ONE biophysics class, even though biophysics is a focus of the major and presumably what attracted the student in the first place, and no electives where student could take other such classes.

To address this we propose adding significant flexibility to the degree, by removing some core required classes: pchem 2 CHEM344, modern PHYS 348, physiology BIOL 430, micro lab BIOL225 (courses whose inclusion was originally motivated by the MBB major being conceived of as a premed degree). We then expanded the number of electives from 0 to 4, and classify them into 2 categories:

1. **MBB electives** – these are courses selected as containing significant biophysics related content. Students would need to take 2 of { (PHYS 304 or 410), PHYS420, CHEM538, CHEM553, BIOL555} Since this would be a panel of electives, they would not need to be offered on any specific timetable, providing flexibility not only to the student, but also in administration. (6 credit hours)
2. **Technical electives:** to remain credit hour neutral, and to achieve parity with other degrees offered by the Biology department in elective content, there are another 2 technical electives (any 300 or 400 BIO, CHEM or PHYS course, or approved alternative) (6 or 5 credit hours, depending on PHYS223 or PHYS224 choice (4 or 3 ch))

By creating this flexibility we make it easier to schedule these low enrollment classes (perhaps on a every 2 year schedule) and make the degree easier to complete, especially for transferees, while providing more biophysics content to help grow the major.

## New Course descriptions

### BIO4xx lab “Protein and Molecular Techniques”

*This lab will provide basic familiarity with the conceptual framework and practical operation of techniques in common use for the characterization of biologically relevant molecules, especially molecules and techniques of industrial or medical importance This includes spectroscopic techniques such as NMR and CD, X-ray diffraction and scattering, fluorescence, surface plasmon techniques; measurement of molecular properties such as stability, aggregation and association and binding; and chromatographic techniques to isolate and purify such molecules.*

## UGSC actions

Since this is credit-hour neutral, this revision seems to qualify as “minor change” and thus presentation as informational only.

This does not impact any classes required by any other majors.

## Curriculum

The current and proposed revised MBB curricula are shown, as well as the basic biology BS and the other specialized degree offered by Biology department, biochemistry (BCHM)

<b>BIOlogy</b>	<b>CH</b>	<b>126</b>		<b>BCHM</b>	<b>CH</b>	<b>128</b>		<b>MBB</b>	<b>now</b>	<b>CH</b>	<b>129</b>		<b>MBB</b>	<b>proposed</b>	<b>CH</b>	<b>129</b>		
Biology	100	2		100	2			100	2				100	2				
	107	3		107	3			107	3				107	3				
	109	1		109	1			109	1				109	1				
	115	3		115	3			115	3				115	3				
	117	1		117	1			117	1				117	1				
	210	3		210	3			210	3				210	3				
	214	3		214	3			214	3				214	3				
	225	2						225	2									
	401	3		401	3			401	3				401	3				
	402	3		402	3			402	3				402	3				
	430	3						430	3									
	445	3		445	3			445	3				445	3				
	{404,446,431,491}	3		404	3	{404,446,431,491}	3					4xx	3	4xx			biophys lab	
	{404,446,431,491}	3	{446,431,491}	3	{404,446,431,491}	3							3					
	451	2		451	2			451	2				451	2	or CHEM451			
	495	1						495	1				495	1				
	495	1		495	1			495	1									
	E1	3		E1	3								E1	3				
	E2	3		E2	3								E2	3	or 2			
	E3	3		E3	3								MBB1	3			PHYS410 or PHYS304	
	E4	3		E4	3								MBB2	3			PHYS420	
																	BIOL555	
																	CHEM538	
																	CHEM553	
Chemistry	124	4		124	4			124	4				124	4				
	125	4		125	4			125	4				125	4				
	237	4		237	4			237	4				237	4				
	239	3		239	3			239	3				239	3				
				240	2													
	247	3		247	3			247	3				247	3				
				343	3			343	3				343	3				
				344	4													
				485	1								485	1	or PHYS 495			
Physics	123	4		123	4			123	4				123	4				
	221	4		221	4			221	4				221	4				
	224	3						223	4			224 or 223	3 or 4					
								348	3									
								410	3									
Mathematics	151	5		151	5			151	5				151	5				
	152	5		152	5			152	5				152	5				
				251	4			251	4				251	4				
								252	4				252	4				
	425	3		425	3			425	3				425	3				
CS	105	2		105	2			104	2				104	2				
Humanities	1xx	3		1xx	3			1xx	3				1xx	3				
	3xx	3		3xx	3			3xx	3				3xx	3				
	3yy	3		3yy	3			3yy	3				3yy	3				
Soc. Science	1xx	3		1xx	3			1xx	3				1xx	3				
	1yy	3		1yy	3			1yy	3				3yy	3				
	3yy	3		3yy	3			3yy	3				3yy	3				
Hum/SocSci	1xx	3		1xx	3			1xx	3				1xx	3				
IPro	497	3		497	3			497	3				497	3				
	497	3		497	3			497	3				497	3				
Free Elective	1	3																

**N.B.: E1 and E2 “Technical Elective”; MBB1 and MBB2 “MBB elective”**

## Required courses

### Bachelor of Science in Molecular Biochemistry and Biophysics

	Credit Hours
<b>Biology Requirements</b>	34
BIOL 100, 107, 109, 115, 117, 210, 214, 401, 402, 445, 451 (or CHEM 451), 495	
<b>Chemistry Requirements</b>	22
CHEM 124, 125, 237, 239, 247, 321, 343, 485 (or PHYS495)	
<b>Physics Requirements</b>	11 or 12
PHYS 123, 221, (223 or 224)	
<b>MBB Electives</b>	6
2 of { (PHYS 304 or 410), PHYS420, CHEM538, CHEM553, BIOL555}	
<b>Technical Electives</b>	6 or 5
any BIOL/CHEM /PHYS 300+ course or other approved course	
<b>Mathematics Requirements</b>	21
MATH151, 152, 251, 252, 425	
<b>Computer Science Requirement</b>	2
CS104	
<b>Humanities and Social Science Requirements</b>	21
<b>I PRO</b>	6
<b>Total</b>	129

Sample schedule

BIOL 100	2			BIOL 115	3		
BIOL 107	3			BIOL 117	1		
BIOL 109	1			CHEM 125	4		
CHEM 124	4			MATH 152	5		
MATH 151	5			HUM 200	3		
			<b>15</b>				<b>16</b>
BIOL 214	3			BIOL 210	3		
CHEM 237	4			CHEM 239	3		
PHYS 123	4			PHYS 221	4		
CS 104	2			H 3xx	3		
2 2xx	3			MATH 251	4		
			<b>16</b>				<b>17</b>
BIOL 401	3			BIOL 402	3		
CHEM 247	3			BIOL 495	1		
PHYS 224	3			CHEM 343	3		
MATH 252	4			TechElec	3		
IPRO	3			H 3xx	3		
			<b>16</b>	IPRO	3		
							<b>16</b>
BIOL 445	3			BIOL 451	2		
BIOL 404	3			BIOL 4xx	3		
CHEM 485	1			MATH 425	3		
MBB Elec	3			MBB Elec	3		
TechElec	3			S 3xx	3		
H/S	3			S 3xx	3		
			<b>16</b>				<b>17</b>
				<b>TOTAL</b>			<b>129</b>