

# Physics and Music with Concentration in Music Technology, BS

The combined major in physics and music provides a strong foundation in classical and modern physics, along with the physics of acoustic and digital audio-related phenomena, and studies of the various physical phenomena including electromagnetism, dynamics, building blocks of matter, energy, and radiation. It also provides students with a solid background in the interdisciplinary application of creative audio technologies to a broad range of outcomes, including analog/digital systems, hardware and software design, musical instrument design, audio synthesis and signal processing, human-computer interaction, and innovative artistic applications of music technology. The combined major allows students to learn how physical principles influence sound production and propagation.

## Program Requirements

Complete all courses listed below unless otherwise indicated. Also complete any corequisite labs, recitations, clinicals, or tools courses where specified and complete any additional courses needed beyond specific college and major requirements to satisfy graduation credit requirements.

## Universitywide Requirements

All undergraduate students are required to complete the Universitywide Requirements (<http://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/>).

## NUpath Requirements

All undergraduate students are required to complete the NUpath Requirements (<http://catalog.northeastern.edu/undergraduate/university-academics/nupath/>).

## Physics Major Requirements

Code	Title	Hours
<b>Introductory Physics</b>		
<i>Physics 1</i>		
PHYS 1161 and PHYS 1162	Physics 1 and Lab for PHYS 1161	5
<i>Physics 2</i>		
PHYS 1165 and PHYS 1166	Physics 2 and Lab for PHYS 1165	5
<b>Intermediate Physics</b>		
PHYS 2303	Modern Physics	4
PHYS 2371 and PHYS 2372	Electronics and Lab for PHYS 2371	4
<b>Advanced Physics</b>		
PHYS 3600	Advanced Physics Laboratory	4
PHYS 3602	Electricity and Magnetism 1	4
PHYS 4115	Quantum Mechanics	4
PHYS 4305	Thermodynamics and Statistical Mechanics	4
PHYS 5318	Principles of Experimental Physics	4

## Supporting Courses

Code	Title	Hours
<b>Mathematics</b>		
MATH 1341	Calculus 1 for Science and Engineering	4
MATH 1342	Calculus 2 for Science and Engineering	4
MATH 2321	Calculus 3 for Science and Engineering	4
MATH 2341	Differential Equations and Linear Algebra for Engineering	4

## Music Requirements

Code	Title	Hours
<b>Music Theory and Composition</b>		
MUSC 1201	Music Theory 1	4
MUSC 1202	Music Theory 2	4
Complete one of the following:		
MUSC 2111	Algebra and Geometry of Music	4

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MUSC 3300	Music Perception and Cognition	
MUSC 3541	Music Analysis Seminar	
MUST 2102	Composing with Digital Technologies	

### Music in Context

Complete one of the following: 4

MUSC 1001	Music in Everyday Life	
MUSC 1002 and MUSC 1003	Music in Everyday Life and Lab for MUSC 1002	

### Contemporary/Popular Music

Complete one of the following: 4

MUSC 2101	Black Popular Music	
MUSC 2150	Making a Musical: Analysis, Craft, and Creation	
MUSC 2310	Popular Music Since 1945	
MUSC 2311	Topics in American Music	
MUSC 2317	Punk Rock	
MUSC 2320	40,000 Years of Music Technology	
MUSC 2336	The Festival Experience	
MUSC 2340	Divas, DJs, and Double Standards	
MUSC 2351	Music, Sound, and the Screen	
MUSC 2380	The World of Choral Music	
MUSC 3352	Sounding Human	
MUSC 3353	Music and the Racial Imagination	
MUSC 3354	Sound and the Sacred	
MUSI 3360	Global Music Industries in Context	
MUSI 3401	Hip Hop in the Music Industry	

### Music Technology

MUSC 2350	Acoustics and Psychoacoustics of Music	4
MUST 1220	Introduction to Music Technology	4
MUST 2431	Computer Music Fundamentals	4

### Music Technology Electives

Complete two of the following: 8

MUSC 4510	Music and the Brain Research	
MUST 3540	Special Topics in Music Technology	
MUST 3601	Digital Audio Signal Processing	
MUST 3602	Electronics for Music	
MUST 3603	Embedded Audio Programming	
MUST 4610	Composition for Electronic Instruments	

### Music Technology Capstone

MUST 4611	Music Technology Capstone/Senior Recital	4
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## Physics/Music Integrative Requirement

Code	Title	Hours
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### Integrative Course Requirement

MUSC 2350	Acoustics and Psychoacoustics of Music	4
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## Physics and Music Combined Major Credit Requirement

Complete a minimum of 98 semester hours in the major.

## Music Technology Major Grade Requirement

Students must maintain at least a 2.667 GPA (B– average) in the requirements of the music half of the combined major and also complete all required music courses with grades of at least C. Students who fail to meet the above standards will be placed on departmental probation; those who remain on probation for two consecutive semesters will be dropped from the major.

## Program Requirement

131 total semester hours required

## Plan of Study

### Note on Physics Courses in Plans of Study

Some required physics courses are offered in both fall and spring semesters, while other required courses are offered less frequently. Therefore, the suggested plan of study will vary from student to student, **depending on the year of entry for that student.**

See course offering schedule at the end of the plans of study.

Please contact your academic advisor for additional information and plans of study.

### FIVE YEARS, TWO CO-OPS IN SPRING/SUMMER 1

Year 1								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
ENGW 1111		4 MATH 1342		4 Vacation		Vacation		
MATH 1341		4 MUST 1220		4				
Select one of the following:		4 PHYS 1165		4				
MUSC 1001		PHYS 1166		1				
MUSC 1002 and MUSC 1003		PHYS 1167		0				
PHYS 1000		1 Elective		4				
PHYS 1161		4						
PHYS 1162		1						
PHYS 1163		0						
		<b>18</b>		<b>17</b>		<b>0</b>		<b>0</b>
Year 2								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
MATH 2321		4 MATH 2341		4 Vacation		Vacation on ODD years. See offering schedule for EVEN years.		
MUSC 1201		4 MUSC 1202		4				
PHYS 2303		4 MUSC 2350		4				
Elective		4 PHYS 3602		4				
		<b>16</b>		<b>16</b>		<b>0</b>		<b>0</b>
Year 3								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
EESC 2000		1 Co-op		Co-op		PHYS 3600		4
MUSC 3541, 2111, or 3300		4				PHYS 4305		4
MUST 2102		4						
MUST 2431		4						
PHYS 2371		3						
PHYS 2372		1						
		<b>17</b>		<b>0</b>		<b>0</b>		<b>8</b>
Year 4								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
MUSC 3541, 2111, or 3300		4 Co-op		Co-op		Vacation		
MUST 3540		4						
PHYS 4115		4						
Music elective		4						
		<b>16</b>		<b>0</b>		<b>0</b>		<b>0</b>
Year 5								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
ENGW 3307		4 MUST 4611		4				
MUST 4610		4 PHYS 5318		4				
Elective		4						

Elective	4							
	<b>16</b>			<b>8</b>				

Total Hours: 132

#### FOUR YEARS, ONE CO-OP IN SPRING/SUMMER 1

Year 1								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
ENGW 1111		4 MATH 1342		4 Vacation		Vacation		
MATH 1341		4 MUST 1220		4				
Select one of the following:		4 PHYS 1165		4				
MUSC 1001		PHYS 1166		1				
MUSC 1002 and MUSC 1003		PHYS 1167		0				
PHYS 1000		1 Elective		4				
PHYS 1161		4						
PHYS 1162		1						
PHYS 1163		0						
		<b>18</b>		<b>17</b>		<b>0</b>		<b>0</b>
Year 2								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
MATH 2321		4 MATH 2341		4 Vacation		PHYS 3600		4
MUSC 1201		4 MUSC 1202		4		Elective in ODD years, PHYS 4305 in EVEN years		4
PHYS 2303		4 MUSC 2350		4				
PHYS 2371		3 PHYS 3602		4				
PHYS 2372 <sup>3</sup>		1						
		<b>16</b>		<b>16</b>		<b>0</b>		<b>8</b>
Year 3								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
EESC 2000		1 Co-op		Co-op		ENGW 3307		4
MUSC 3541, 2111, or 3300		4				PHYS 4305 (in EVEN years, elective in ODD years)		4
MUST 2102		4						
MUST 2431		4						
PHYS 4115		4						
		<b>17</b>		<b>0</b>		<b>0</b>		<b>8</b>
Year 4								
Fall	Hours	Spring	Hours	Hours	Hours	Hours	Hours	Hours
MUSC 3541, 2111, or 3300		4 MUST 4611		4				
MUST 3540		4 PHYS 5318		4				
MUST 4610		4 Elective		4				
Music elective		4 Elective		4				
		<b>16</b>		<b>16</b>				

Total Hours: 132

#### Offerings Schedule (Subject to Changes)

- PHYS 2303 offered every fall, spring, and summer 2
- PHYS 2371/2372 offered every fall
- PHYS 3600 offered every summer 1 and summer 2 (take in year 2 or 3, whichever is even)
- PHYS 3601 offered spring and fall (even years)
- PHYS 3602 offered every fall and spring
- PHYS 3603 offered fall (even years) and summer 1 (odd years)
- PHYS 4115 offered every fall and spring

- PHYS 4305 offered every spring and summer 2 (**take in year 2 or 3, whichever is even**)
- PHYS 4621 offered spring (odd years) and fall (even years)
- PHYS 4623 offered summer 1 and fall (even years)
- PHYS 4651 offered spring and fall (odd years)
- PHYS 4652 offered every spring
- PHYS 5318 offered every spring