

## MUSIC (COURSE 21M)

*The Music subjects described below are grouped within seven areas: Introductory, Samplings, History/Culture, Composition/Theory, Performance, Advanced/Special Subjects, and Music and Media. Although most students start with introductory subjects, those who have vocal or instrumental training or extensive exposure to music are encouraged to begin at a higher starting level.*

### Introductory Subjects

#### Introductory Subjects

##### 21M.011 Introduction to Western Music

Prereq: None

U (Fall, Spring)

4-0-8 units. HASS-A; CI-H

Provides a broad overview of Western music from the Middle Ages to the 21st century, with emphasis on late baroque, classical, romantic, and modernist styles. Designed to enhance the musical experience by developing listening skills and an understanding of diverse forms and genres. Major composers and works placed in social and cultural contexts. Weekly lectures feature demonstrations by professional performers and introduce topics to be discussed in sections. Enrollment limited.

*E. Pollock, M. Marks, T. Neff*

##### 21M.013[J] The Supernatural in Music, Literature and Culture

Same subject as 21L.013[J]

Prereq: None

U (Fall)

Not offered regularly; consult department

3-0-9 units. HASS-A, HASS-H; CI-H

Explores the relationship between music and the supernatural, focusing on the social history and context of supernatural beliefs as reflected in key literary and musical works from 1600 to the present. Provides an understanding of the place of ambiguity and the role of interpretation in culture, science and art. Explores great works of art by Shakespeare, Verdi, Goethe (in translation), Gounod, Henry James and Benjamin Britten. Readings also include selections from the most recent scholarship on magic and the supernatural. Writing assignments range from web-based projects to analytic essays. No previous experience in music is necessary. Projected guest lectures, musical performances, field trips. Limited to 36.

*C. Shadle, M. Fuller*

##### 21M.030 Introduction to Musics of the World

Prereq: None

U (Fall, Spring)

3-0-9 units. HASS-A; CI-H

An introduction to diverse musical traditions of the world. Music from a wide range of geographical areas is studied in terms of structure, performance practice, social use, aesthetics, and cross-cultural contact. Includes music making, live demonstrations by guest artists, and ethnographic research projects. Enrollment limited by lottery.

*P. Tang, L. Tilley, E. Ziporyn*

##### 21M.051 Fundamentals of Music

Prereq: None

U (Fall, Spring)

3-2-7 units. HASS-A

Introduces students to the rudiments of Western music through oral, aural, and written practice utilizing rhythm, melody, intervals, scales, chords, and western staff notation. Individual skills are addressed through a variety of approaches, including the required piano and sight singing labs. Intended for students with little to no prior experience reading music or performing. Not open to students who have completed 21M.150, 21M.151, 21M.301, 21M.302, or are proficient in reading music. Limited to 18 per section.

*S. Iker, D. David*

##### 21M.053 Rhythms of the World

Prereq: None

U (Spring)

3-0-9 units. HASS-A

Experiential, fully-embodied exploration into the fundamentals of music through the lens of largely non-Western, aural music cultures. From Bali to Ghana, Cuba to India, Zimbabwe to Andalucía, and through popular musics across the globe, students think about, talk about, and make music in new ways. Examines some of the basic concepts of music — structure, melody-making, meter, rhythm, interaction, movement, etc. — studying their diverse incarnations in different music cultures and encouraging a breadth of perspective and engagement. Students engage with a diverse blend of musical practices through music-making, in-depth discussion, listening and analysis, and creative composition. No musical experience required. Limited to 18.

*L. Tilley*

### 21M.065 Introduction to Musical Composition

Prereq: Permission of instructor

U (Summer)

3-0-9 units. HASS-A

Through a progressive series of composition projects, students investigate the sonic organization of musical works and performances, focusing on fundamental questions of unity and variety. Aesthetic issues are considered in the pragmatic context of the instructions that composers provide to achieve a desired musical result, whether these instructions are notated in prose, as graphic images, or in symbolic notation. Weekly listening, reading, and composition assignments draw on a broad range of musical styles and intellectual traditions, from various cultures and historical periods. Basic music reading skills required. Limited to 18.

*E. Ziporyn*

### 21M.080 Introduction to Music Technology

Subject meets with 21M.560

Prereq: None

U (Fall, Spring)

3-0-9 units. HASS-A

Investigates how technology is used in the analysis, modeling, synthesis and composition of music, and its contribution to the artistic production practice. With an eye towards historical context as well as modern usage, topics include the physics of sound, digital representations of music, the Digital Audio Workstation (DAW), analog and digital synthesis techniques, MIDI and sequencing, electronic instrument design, notation software, generative music systems, and computational analysis of music. Weekly assignments focus on both theory and practice, requiring technical proficiency, creative output, and aesthetic consideration. Students taking graduate version complete different assignments. Enrollment limited.

*I. Hattwick*

### Samplings

*Students may combine any of the 6-unit subjects listed below for 12 units (one full subject) of credit toward the Humanities, Arts, and Social Sciences (HASS) General Institute Requirement (GIR). Even-numbered subjects are offered the first half of term; odd-numbered subjects are offered the second half of term. Where noted, subjects may be repeated for 12 units of HASS GIR credit. See the HASS Requirement website (<https://registrar.mit.edu/registration-academics/academic-requirements/hass-requirement/substitutions-within-hass-requirement>) for details.*

### 21M.120 Tuning Systems and Temperament

Prereq: Permission of instructor

U (Spring; first half of term)

Not offered regularly; consult department

2-0-4 units

Surveys selected tunings of the scale, including Pythagorean, just intonation, mean-tone, and equal temperaments, as well as non-Western systems and the impact of tunings and temperaments on musical composition and performance. Student projects will be based on live demonstrations as well as reading and listening assignments.

*T. Neff*

### 21M.128 Moments in Music: History/Culture A

Prereq: Permission of instructor

U (Spring; first half of term)

2-0-4 units

Can be repeated for credit.

Examines a particular moment in music history, an era, style, or even the composition of a major work through analysis and cultural context. Goes into further depth on a particular topic than would be possible in a longer survey. Periods and topics vary. Examples include minimalism, The Beatles, A Cappella, or The Lion King. May be repeated once for credit if content differs. Enrollment limited.

*M. Marks, T. Neff*

### 21M.129 Moments in Music: History/Culture B

Prereq: Permission of instructor

Acad Year 2024-2025: U (Spring; second half of term)

Acad Year 2025-2026: Not offered

2-0-4 units

Can be repeated for credit.

Examines a particular moment in music history, an era, style, or even the composition of a major work through analysis and cultural context. Goes into further depth on a particular topic than would be possible in a longer survey. Periods and topics vary. Examples include minimalism, The Beatles, A Cappella, or The Lion King. May be repeated once for credit if content differs. Enrollment limited.

*M. Marks, T. Neff*

**21M.138 Moments in Music: Composition A**

Prereq: Permission of instructor

U (Spring; first half of term)

Not offered regularly; consult department

2-0-4 units

Can be repeated for credit.

Practice in a particular compositional technique not normally covered in the Harmony and Counterpoint or Musical Composition sequences. Possible topics include Renaissance counterpoint, fugue, ragtime, or indeterminacy. May be repeated once for credit if content differs. Enrollment limited.

*C. Shadle***21M.139 Moments in Music: Composition B**

Prereq: Permission of instructor

Acad Year 2024-2025: U (Fall, Spring; second half of term)

Acad Year 2025-2026: Not offered

2-0-4 units

Can be repeated for credit.

Practice in a particular compositional technique not normally covered in the Harmony and Counterpoint or Musical Composition sequences. Possible topics include Renaissance counterpoint, fugue, ragtime, or indeterminacy. May be repeated once for credit if content differs. Enrollment limited.

*C. Shadle***21M.150 Accelerated Fundamentals of Music**

Prereq: None

U (Fall, Spring; first half of term)

1-1-4 units

Credit cannot also be received for 21M.151

Accelerated half-semester study of the fundamentals of Western music. Requires ability to read Western staff notation in at least one clef. Coverage includes intervals, triads, major and minor keys, basic musical analysis over a variety of idioms in Western music. Also emphasizes developing the ear, voice, and keyboard skills. Not open to students who have completed or are enrolled in 21M.051, 21M.151, 21M.301, or 21M.302. Subject content is identical to 21M.151: 21M.150 is offered first half of term; 21M.151 is offered second half of term or during IAP. Limited to 18 per section.

*Staff***21M.151 Accelerated Fundamentals of Music**

Prereq: None

U (Fall, Spring; second half of term)

Not offered regularly; consult department

1-1-4 units

Credit cannot also be received for 21M.150

Accelerated half-semester study of the fundamentals of Western music. Requires ability to read Western staff notation in at least one clef. Coverage includes intervals, triads, major and minor keys, basic musical analysis over a variety of idioms in Western music. Also emphasizes developing the ear, voice, and keyboard skills. Not open to students who have completed or are enrolled in 21M.051, 21M.151, 21M.301 or 21M.302. Subject content is identical to 21M.150: 21M.150 is offered first half of term; 21M.151 is offered second half of term or during IAP. Limited to 18 per section.

*Staff***21M.158 Moments in Music: Theory and Analysis A**

Prereq: Permission of instructor

U (Fall; first half of term)

Not offered regularly; consult department

2-0-4 units

Can be repeated for credit.

Specific musical compositions or topics in music theory will provide the basis for analysis and close reading. Topics vary. Examples include a Bach Cantata, a Beethoven Quartet, Pierrot Lunaire, or cross-cultural musical analysis. May be repeated once for credit if content differs. Enrollment limited.

*Staff***21M.159 Moments in Music: Theory and Analysis B**

Prereq: Permission of instructor

U (Fall; second half of term)

Not offered regularly; consult department

2-0-4 units

Can be repeated for credit.

Specific musical compositions or topics in music theory will provide the basis for analysis and close reading. Topics vary. Examples include a Bach Cantata, a Beethoven Quartet, Pierrot Lunaire, or cross-cultural musical analysis. May be repeated once for credit if content differs. Enrollment limited.

*Staff*

## History/Culture

### 21M.215 Music of the Americas

Prereq: Permission of instructor  
Acad Year 2024-2025: U (Spring)  
Acad Year 2025-2026: Not offered  
3-0-9 units. HASS-A

A survey of the music of North and South America from the Renaissance to the present, with emphasis on the cross-fertilizations of indigenous and European traditions. Listening assignments will focus on composers as varied as Copland and Still, Revueltas and Chihara.

*C. Shadle*

### 21M.220 Medieval and Renaissance Music

Prereq: None. Coreq: 21M.301  
Acad Year 2024-2025: U (Fall)  
Acad Year 2025-2026: Not offered  
3-0-9 units. HASS-A

Examines European, Mediterranean basin, and Latin American music in the ancient world, Middle Ages, and the Renaissance (to 1630). Interweaves a chronological survey with the intensive study of three topics, which are usually chant and its development, music in Italy 1340-1420, and music in Elizabethan England. Focuses on methods and pitfalls in studying music of the distant past. Students work with original sources and facsimiles in crafting research papers, presentation, and assignments.

*M. Cuthbert*

### 21M.223 Folk Music of the British Isles and North America

Prereq: None  
U (Fall)  
3-0-9 units. HASS-A; CI-H

Examines the production, transmission, preservation and the qualities of folk music in the British Isles and North America from the 18th century to the folk revival of the 1960s and the present. Special emphasis on balladry, fiddle styles, and African-American influences. Enrollment limited.

*J. Maurer*

### 21M.226 Jazz

Prereq: None  
U (Spring)  
3-0-9 units. HASS-A

Historical survey from roots in African and American contexts, including spirituals, blues, and ragtime, through early jazz, Swing, bebop, and post-bop movements, with attention to recent developments. Key jazz styles, the relation of music and society, and major figures such as Armstrong, Ellington, Basie, Goodman, Parker, Monk, Mingus, Coltrane, and others are considered. Some investigation of cross-influences with popular, classical, folk, and rock musics. Enrollment may be limited.

*Staff*

### 21M.235 Baroque and Classical Music

Prereq: 21M.301 or permission of instructor  
U (Spring)  
3-0-9 units. HASS-A

Surveys genres from the Western tradition composed in the 17th and 18th centuries: opera, cantata, oratorio, sonata, concerto, quartet and symphony. Includes the composers Monteverdi, Purcell, Lully, Strozzi, Vivaldi, Bach, Handel, Haydn, Bologne, and Mozart. Bases written essays, projects, and oral presentations on live performances as well as listening and reading assignments. Basic music score-reading ability required.

*T. Neff*

### 21M.250 Nineteenth-Century Music

Prereq: 21M.301 or permission of instructor  
U (Spring)  
3-0-9 units. HASS-A

Surveys 19th century Western concert music including Lied/song, choral music, opera, piano sonata/character piece, concerto, and symphony/symphonic poem. Includes the composers Beethoven, Schubert, Berlioz, Chopin, Farrenc, Brahms, Verdi, Tchaikovsky, Beach, Smyth, and Mahler. Bases written work and oral presentations on live performances as well as listening and reading assignments. Basic score-reading ability recommended.

*T. Neff*

**21M.260 Music since 1900**

Prereq: 21M.301 or permission of instructor

Acad Year 2024-2025: Not offered

Acad Year 2025-2026: U (Fall)

3-0-9 units. HASS-A

Surveys musical works drawn from many genres, representing stylistic movements that have transformed classical music over the past hundred years. Focal topics include musical modernism, serialism, neoclassicism, nationalism and ideology, minimalism, and aleatoric and noise composition experiments. Discusses electronic and computer music, and new media and the postmodern present. Begins with Stravinsky's early ballets and ends with music by current MIT composers and other important figures active today. Ability to read music required. Instruction and practice in oral and written communication provided.

*M. Marks***21M.269 Studies in Western Music History**

Prereq: 21M.301 or permission of instructor

Acad Year 2024-2025: U (Fall, Spring)

Acad Year 2025-2026: Not offered

3-0-9 units. HASS-A

Can be repeated for credit.

Explores particular questions or repertoires in Western classical music. Requires individual participation, presentations, and writing. Topics vary each year. Examples include women in music, musical borrowing, the Ars Nova, Schumann, or music after 1990. May be repeated for credit with permission of instructor.

*Staff***21M.271 Symphony and Concerto**

Prereq: None

Acad Year 2024-2025: Not offered

Acad Year 2025-2026: U (Spring)

3-0-9 units. HASS-A

Explores the style, form, and history of approximately two dozen pieces of canonical symphonic repertoire. Students write short reviews of musicological articles on the rich cultural history of selected works and complete one project about classical music in contemporary society. Basic score-reading ability required.

*E. Pollock***21M.273 Opera**

Prereq: None

Acad Year 2024-2025: U (Fall)

Acad Year 2025-2026: Not offered

3-0-9 units. HASS-A

Focuses on the different styles and dramatic approaches exhibited by a range of operas. Important themes include dramatic and musical conventions, processes of adaptation, cultural and critical questions, and staging as a type of interpretation. Basic score-reading ability required.

*E. Pollock***21M.283 Musicals**

Prereq: One subject in film, music, or theater or permission of instructor

Acad Year 2024-2025: Not offered

Acad Year 2025-2026: U (Spring)

3-0-9 units. HASS-A

Covers select Broadway stage works and Hollywood films in depth. Proceeds chronologically within four historical categories: breakthrough musicals of the 1920s and '30s; classic "book musicals" of the '40s and '50s; modernist and concept musicals of the '60s and '70s; and postmodern and cutting-edge works of the '80s and '90s. Recent musicals also explored. Attention given to the role of music in relation to script, characterization, and dramatic structure. Papers involve comparison of at least one stage and one film work, selected in consultation with the instructor. Oral presentations required and in-class performances encouraged.

*M. Marks***21M.284 Film Music**

Subject meets with CMS.925

Prereq: None

U (Fall)

3-0-9 units. HASS-A

Provides a conceptual foundation and methodology for the study of music created for various types of (mainly) narrative films, from the medium's origins in the early twentieth century to the present. Close attention to select influential scores by composers active in Hollywood from the 1940s to the 1990s (e.g., Max Steiner, Bernard Herrmann, Quincy Jones, John Williams, Philip Glass). Those works are juxtaposed with landmarks of alternative film and musical styles from other countries and centers of production. Subsidiary topics include the history and challenges of live musical accompaniment to silent films, and the evolution of recording and sound-editing technologies from the studio era to the global present. Students taking the graduate version complete different assignments. Some background in the study of film and/or music is desirable, but not a prerequisite.

*M. Marks*

### 21M.285 The Beatles

Prereq: 21M.301 or permission of instructor

Acad Year 2024-2025: Not offered

Acad Year 2025-2026: U (Fall)

3-0-9 units. HASS-A

Surveys the music of the Beatles, from the band's early years as the Quarrymen (1956-1960), through the rise of "Beatlemania" in the 1960s, and the break-up of the group with the turn of 1970. Listening and reading assignments focus on the construction and analysis of selected songs with the goal of mapping how the Beatles' musical style changed from skiffle and rock to studio-based experimentation and the concept album. Discussions include the cultural influences that helped shape not only the music, but also the image of the group and its individual members, as well as the Beatles' influence on both popular music and culture worldwide. Limited to 21.

*T. Neff*

### 21M.289 Studies in Western Classical Genres

Prereq: 21M.301 or permission of instructor

U (Spring)

Not offered regularly; consult department

3-0-9 units. HASS-A

Can be repeated for credit.

Explores topics concerned with specific types of classical music, such as repertoires for instrumental soloists and/or small ensembles, orchestral works, solo songs, choral works, or compositions for theater, film, or new media. Topics vary and may require additional prerequisites or specialized skills such as score-reading or playing an instrument. Examples include the English madrigal, Baroque chamber music, Beethoven's symphonies, French art song, Wagner's 'Ring' cycle, American choral music, Stravinsky's theater works, and the Hollywood film score. May be repeated for credit with permission of instructor.

*Staff*

### 21M.291 Music of India

Prereq: None

U (Spring)

Not offered regularly; consult department

3-0-9 units. HASS-A

Focuses on Hindustani classical music of North India, and also involves learning about the ancient foundations of the rich classical traditions of music and dance of all Indian art and culture. Practice of the ragas and talas through the learning of songs, dance, and drumming compositions. Develops insights through listening, readings, and concert attendance.

*Staff*

### 21M.292 Musics in Bali

Prereq: None

Acad Year 2024-2025: U (Fall)

Acad Year 2025-2026: Not offered

3-0-9 units. HASS-A

Studies diverse musical practices in Bali, Indonesia. Students encounter a broad spectrum of Balinese musics — from ancient ritual and court musics to popular genres, internationally renowned gamelan traditions to radical contemporary and fusion compositions — engaging with their structures and techniques through music-making, listening analysis, music theory, composition, and dance. Explores the cultural, political, social, and historical contexts of these musics, grappling with complex questions of identity, representation, power, and belief through readings and discussion forums, creative open-ended projects, and in-depth class discussion. No musical experience required. Limited to 15.

*L. Tilley*

### 21M.293 Musics of Africa

Prereq: None

Acad Year 2024-2025: U (Spring)

Acad Year 2025-2026: Not offered

3-0-9 units. HASS-A

Studies musical traditions of sub-Saharan Africa, with focus on West Africa. Explores a variety of musical practices and their cultural contexts through listening, reading and writing assignments with an emphasis on class discussion. Includes in-class instruction in drumming, song and dance of Senegal, Ghana, and South Africa, as well as live lecture-demonstrations by guest performers from throughout sub-Saharan Africa. Limited to 15; preference to majors, minors, concentrators. Admittance may be controlled by lottery.

*P. Tang*

### 21M.294 Popular Musics of the World

Prereq: None

U (Fall)

3-0-9 units. HASS-A

Examines select popular music genres from around the world through audio-visual materials, reading assignments, and classroom discussion. Considers issues of globalization, appropriation, and the impact of social media. Case studies include bhangra, Latin pop, Afropop, reggae, Kpop, and global hip-hop. Limited to 25; preference to Music majors, minors, concentrators. Admittance may be controlled by lottery.

*P. Tang*



**21M.295 American Popular Music**

Prereq: None

U (Spring)

3-0-9 units. HASS-A

Surveys the development of popular music in the US, and in a cross-cultural milieu, relative to the history and sociology of the last two hundred years. Examines the mixture that characterizes modern music, and how it reflects many rich traditions and styles (minstrelsy, Tin Pan Alley, blues, country, rock, soul, rap, techno, etc.). Provides a background for understanding the musical vocabulary of current popular music styles. Limited to 20.

*W. Marshall***21M.296 Studies in Jazz and Popular Music**

Prereq: None

U (Fall)

3-0-9 units. HASS-A

Can be repeated for credit.

Studies of selected topics in popular music and/or jazz. Topics vary. Examples include Duke Ellington, Bob Dylan, hip-hop, and the 1980s. May be repeated for credit with permission of instructor.

*Staff***21M.297[J] Cultures of Popular Music in East Asia: Japan, Korea, China**

Same subject as 21G.095[J], WGS.150[J]

Subject meets with 21G.595

Prereq: None

U (Spring)

Not offered regularly; consult department

3-0-9 units. HASS-A

See description under subject 21G.095[J].

*I. Condry***21M.299 Studies in Global Musics**

Prereq: 21M.030 or permission of instructor

U (Spring)

3-0-9 units. HASS-A

Can be repeated for credit.

Studies of selected topics in ethnomusicology (the study of music in culture). Topics vary. Examples include the social lives of musical instruments, music and storytelling, fieldwork methodologies, music and politics, and theories of global musics. May be repeated for credit with permission of instructor.

*Staff***Composition/Theory****21M.301 Harmony and Counterpoint I**

Subject meets with 21M.541

Prereq: 21M.051, 21M.151, or permission of instructor

U (Fall, Spring)

3-3-6 units. HASS-A

Explores Western diatonic music through regular composition and analysis assignments. Engages a broad range of historical periods, traditions, and individuals. Topics include rhythm and meter, harmony and counterpoint within a single key, and a brief overview of form and modulation. Individual skills are addressed through a variety of approaches, including the required piano and sight singing labs. Local musicians perform final composition projects. Students should be proficient in reading Western staff notation in at least one clef and have experience with key signatures and scales. Students taking the graduate version complete additional assignments. Limited to 18 per section.

*S. Iker, E. Ruehr***21M.302 Harmony and Counterpoint II**

Prereq: 21M.301 or permission of instructor

U (Fall, Spring)

3-2-7 units. HASS-A

A continuation of 21M.301, including chromatic harmony and modulation, a more extensive composition project, keyboard laboratory, and musicianship laboratory. Limited to 20 per section.

*S. Iker, P. Child***21M.303 Writing in Tonal Forms I**

Prereq: 21M.302

U (Fall, Spring)

3-1-8 units. HASS-A

Written and analytic exercises based on 18th- and 19th-century small forms and harmonic practice found in music such as the chorale preludes of Bach; minuets and trios of Haydn, Mozart, and Beethoven; and the songs and character pieces of Schubert and Schumann. Musicianship laboratory is required. Limited to 20 per section.

*C. Shadle*

### 21M.304 Writing in Tonal Forms II

Prereq: 21M.303

U (Spring)

3-1-8 units. HASS-A

Further written and analytic exercises in tonal music, focusing on larger or more challenging forms. For example, students might compose a sonata-form movement for piano or a two-part invention in the style of Bach. Students have opportunities to write short works that experiment with the expanded tonal techniques of the late 19th and early 20th centuries. Musicianship laboratory is required. Limited to 20.

*P. Child*

### 21M.310 Techniques of 20th-Century Composition

Prereq: 21M.302 or permission of instructor

U (Fall)

3-0-9 units. HASS-A

Students complete written and analytical exercises based on compositional forms and practices from the first half of the 20th century. Areas covered include compositions based upon artificial scales and modes, as in Debussy, Bartok, and Stravinsky; compositions based on atonal pitch organizations, as with Schoenberg and Webern; compositions based on rhythmic process, timbral exploration, and/or non-Western influences. Basic instrumentation will be taught, and compositions will be performed in class.

*C. Shadle*

### 21M.340 Jazz Harmony and Arranging

Prereq: 21M.051, 21M.226, or permission of instructor

U (Fall, Spring)

3-0-9 units. HASS-A

Basic harmony and theory of mainstream jazz and blues; includes required listening in jazz, writing and analysis work, and two full-scale arrangements. Serves as preparation for more advanced work in jazz with application to rock and pop music. Performance of student arrangements. Limited to 15.

*Staff*

### 21M.341 Jazz Composition

Prereq: 21M.226, 21M.340, or permission of instructor

Acad Year 2024-2025: U (Spring)

Acad Year 2025-2026: Not offered

3-0-9 units. HASS-A

Jazz writing using tonal, modal, and extended compositional approaches as applied to the blues, the 32-bar song form, and post-bop structural designs. Consideration given to a variety of styles and to the ways improvisation informs the compositional process. Study of works by Ellington, Mingus, Parker, Russell, Golson, Coleman, Coltrane, Hancock, Tyner, Davis, and others. Performance of student compositions. Limited to 15.

*Staff*

### 21M.342 Composing for Jazz Orchestra

Prereq: Permission of instructor

U (Spring)

Not offered regularly; consult department

3-0-9 units. HASS-A

Explores composition and arrangement for the large jazz ensembles from 1920s foundations to current postmodern practice. Consideration given to a variety of styles and to the interaction of improvisation and composition. Study of works by Basie, Ellington, Evans, Gillespie, Golson, Mingus, Morris, Nelson, Williams, and others. Open rehearsals, workshops, and performances of student compositions by the MIT Festival Jazz Ensemble and the Aardvark Jazz Orchestra. Limited to 15.

*Staff*

### 21M.351 Music Composition

Subject meets with 21M.505

Prereq: 21M.304, 21M.310, or permission of instructor

U (Spring)

3-0-9 units. HASS-A

Can be repeated for credit.

Directed composition of original writing involving voices and/or instruments. Includes a weekly seminar in composition for the presentation and discussion of work in progress. Students are expected to produce at least one substantive work that will be performed in public by the end of the term. Contemporary compositions and major works from 20th-century music literature are studied. Students taking the graduate version complete different assignments.

*K. Makan*



**21M.355 Musical Improvisation**

Prereq: Permission of instructor

U (Spring)

3-0-9 units. HASS-A

Students study concepts and practice techniques of improvisation in solo and ensemble contexts. Examines relationships between improvisation, composition, and performance based in traditional and experimental approaches. Topics, with occasional guest lectures, may include jazz, non-western music, and western concert music, as well as improvisation with film, spoken word, theater, and dance. Enrollment limited to 15; open by audition to instrumental or vocal performers.

*Staff***21M.359 Studies in Musical Composition, Theory and Analysis**

Prereq: 21M.051 or permission of instructor

U (Fall)

3-0-9 units. HASS-A

Can be repeated for credit.

Explores techniques associated with musical composition and/or analysis. Written exercises in the form of music (composition) and/or prose (papers) may be required, depending on the topic. Topics vary each year; examples include fugue, contemporary aesthetics of composition, orchestration, music analysis, or music and mathematics. May be repeated for credit with permission of instructor. Limited to 18.

*W. Cutter***Music Technology****21M.361 Electronic Music Composition I**

Subject meets with 21M.561

Prereq: None

U (Fall, Spring)

2-1-9 units. HASS-A

Students develop basic skills in composition through weekly assignments focusing on sampling and audio processing. Source materials include samples of urban/natural environments, electronically generated sounds, inherent studio/recording noise, and pre-existing recordings. Audio processing includes digital signal processing (DSP) and analog devices. Covers compositional techniques, including mixing, algorithms, studio improvisation, and interaction. Students critique each other's work and give informal presentations on recordings drawn from sound art, experimental electronica, conventional and non-conventional classical electronic works, and popular music. Covers technology, math, and acoustics in varying detail. Students taking graduate version complete different assignments. Limited to 15 per section; ; preference to Music Technology graduate students, Music majors, minors, and concentrators.

*P. Whincop***21M.362 Electronic Music Composition II**

Subject meets with 21M.562

Prereq: 21M.361 or permission of instructor

Acad Year 2024-2025: Not offered

Acad Year 2025-2026: U (Spring)

2-2-8 units. HASS-A

Explores sophisticated synthesis techniques, from finely tuned additive to noise filtering and distortion, granular synthesis to vintage emulation. Incorporates production techniques and use of multimedia, with guest lecturers/performers. Considers composing environments such as Max/MSP/Jitter, SPEAR, SoundHack, and Mathematica. Assignments include diverse listening sessions, followed by oral or written presentations, weekly sound studies, critiques, and modular compositions/soundscapes. Prior significant computer music experience preferred. Consult instructor for technical requirements. Students taking graduate version complete different assignments. Limited to 10.

*P. Whincop*

### 21M.369 Studies in Music Technology

Subject meets with 21M.569  
Prereq: Permission of instructor  
U (Fall, Spring)  
3-0-9 units. HASS-A  
Can be repeated for credit.

Explores various technologies in relation to musical analysis, composition, performance, culture, and quantitative methods. Topics vary each term and may include development and impact on society, generative and algorithmic music, recording techniques or procedural sound design. May involve hands-on components such as laptop music ensemble, new instrument building, or comparing the theory and practice of audio recording. Students taking graduate version complete different assignments. Limited to 16.

*I. Hattwick*

### 21M.370 Digital Instrument Design

Subject meets with 21M.570  
Prereq: None  
U (Spring)  
3-6-3 units. HASS-A

Covers aesthetic and technical challenges in the creation of physical interfaces for musical performance. will engage in the design and creation of musical interfaces, and learn how to incorporate new technologies in their artistic practice. Topics covered include user experience design for artistic performance, musical human-computer interaction (HCI), hardware and software standards for digital musical systems, embedded programming and sound synthesis, analog and digital sensors, rapid prototyping and digital manufacturing, and creating performance practices around custom hardware. Students design and build their own digital musical instrument, and present a performance with the instrument as their final project. Students taking graduate version complete different assignments. Limited to 18.

*I. Hattwick*

### 21M.383 Computational Music Theory and Analysis

Subject meets with 21M.583  
Prereq: 6.1010 and (21M.301 or 21M.302)  
Acad Year 2024-2025: Not offered  
Acad Year 2025-2026: U (Spring)  
3-0-9 units. HASS-A

Covers major approaches to analyzing musical scores using computers. Topics include AI/machine learning of style, musical similarity, encoding, music composition, music perception, and big data repertory studies. Programming assignments given in Python. Culminates in an original final project. Students taking graduate version complete different assignments. Enrollment limited.

*M. Cuthbert*

### 21M.385[J] Interactive Music Systems

Same subject as 6.4550[J]  
Subject meets with 21M.585  
Prereq: (6.1010 and 21M.301) or permission of instructor  
U (Fall, Spring)  
3-0-9 units. HASS-A

Explores audio synthesis, musical structure, human computer interaction (HCI), and visual presentation for the creation of interactive musical experiences. Topics include audio synthesis; mixing and looping; MIDI sequencing; generative composition; motion sensors; music games; and graphics for UI, visualization, and aesthetics. Includes weekly programming assignments in python. Teams build an original, dynamic, and engaging interactive music system for their final project. Students taking graduate version complete different assignments. Limited to 36.

*E. Egozy, L. Kaelbling*

### 21M.387[J] Fundamentals of Music Processing

Same subject as 6.3020[J]  
Subject meets with 21M.587  
Prereq: 6.3000 and 21M.051  
U (Fall)  
3-0-9 units. HASS-A

Analyzes recorded music in digital audio form using advanced signal processing and optimization techniques to understand higher-level musical meaning. Covers fundamental tools like windowing, feature extraction, discrete and short-time Fourier transforms, chromagrams, and onset detection. Addresses analysis methods including dynamic time warping, dynamic programming, self-similarity matrices, and matrix factorization. Explores a variety of applications, such as event classification, audio alignment, chord recognition, structural analysis, tempo and beat tracking, content-based audio retrieval, and audio decomposition. Students taking graduate version complete different assignments.

*E. Egozy*

### Performance

*Students may combine or repeat any of the 6-unit subjects listed below for 12 units (one full subject) of credit toward the Humanities, Arts, and Social Sciences (HASS) General Institute Requirement (GIR). See the HASS Requirement website (<https://registrar.mit.edu/registration-academics/academic-requirements/hass-requirement/substitutions-within-hass-requirement>) for details.*

**21M.401 MIT Concert Choir**

Prereq: None

U (Fall, Spring)

0-4-2 units

Can be repeated for credit.

Rehearsals and performance of primarily large-scale works for chorus, soloists, and orchestra--from the Passions and Masses of J. S. Bach to oratorios of our own time. Open to graduate and undergraduate students by audition.

*R. Turner***21M.405 MIT Chamber Chorus**

Prereq: None

U (Fall, Spring)

3-0-3 units

Can be repeated for credit.

Rehearsal and performance of choral repertoire for small chorus, involving literature from the Renaissance to contemporary periods. Limited to 32 by audition.

*R. Turner***21M.410 Vocal Repertoire and Performance**

Subject meets with 21M.515

Prereq: None. *Coreq: Participation in ensemble for vocalists*

U (Spring)

3-0-3 units

Can be repeated for credit.

For the singer and/or pianist interested in collaborative study of solo vocal performance. Historical study of the repertoire includes listening assignments of representative French, German, Italian, and English works as sung by noted vocal artists of the genre. Topics include diction as facilitated by the study of the International Phonetic Alphabet; performance and audition techniques; and study of body awareness and alignment through the Alexander Technique and yoga. Admission by audition; Emerson Vocal Scholars contact department.

*R. Turner***21M.421 MIT Symphony**

Prereq: None

U (Fall, Spring)

0-4-2 units

Can be repeated for credit.

Rehearsals prepare works for concerts and recordings. Analyses of musical style, structure, and performance practice are integrated into rehearsals as a means of enriching musical conception and the approach to performance. Likewise, additional scores of particular structural or stylistic interest are read whenever time permits.

Admission by audition.

*A. Boyles***21M.423 Conducting and Score-Reading**

Prereq: 21M.302 or permission of instructor

U (Fall)

3-0-3 units

Can be repeated for credit.

Introduces ensemble conducting as a technical and artistic discipline. Incorporates ear training, score-reading skills and analysis, rehearsal technique, and studies of various philosophies. Attendance of rehearsals and specific concerts required.

Opportunities include conducting students, professional musicians, and MIT Symphony Orchestra (when possible). Instrumental proficiency required, although vocalists with keyboard abilities will be accepted. May be repeated once for credit with permission of instructor.

*A. Boyles***21M.426 MIT Wind Ensemble**

Prereq: None

U (Fall, Spring)

0-4-2 units

Can be repeated for credit.

Designed for advanced instrumentalists who are committed to the analysis, performance, and recording of woodwind, brass, and percussion literature from the Renaissance through the 21st century. The repertoire consists primarily of music for small and large wind ensembles. May include ensemble music from Gabrieli to Grainger, Schuller, Mozart, Dvorak, and various mixed media including strings. Performance of newly commissioned works. Opportunities for solo work and work with recognized professional artists and composers. Admission by audition.

*F. Harris*

### **21M.442 MIT Festival Jazz Ensemble**

Prereq: None

U (Fall, Spring)

0-4-2 units

Can be repeated for credit.

Designed for instrumentalists dedicated to the analysis, performance, and recording of traditional and contemporary jazz ensemble compositions. Instrumentation includes saxophones, trumpets, trombones, piano, guitar or vibraphone, bass, percussion and occasionally french horn, double reeds, and strings. Provides opportunities to work with professional jazz artists and perform commissioned works by recognized jazz composers. Experience in improvisation preferred but not required. Admission by audition.

*F. Harris*

### **21M.443 MIT Vocal Jazz Ensemble (New)**

Prereq: None

U (Fall, Spring)

0-4-2 units

Can be repeated for credit.

A performance ensemble for vocalists dedicated to studying traditional and contemporary vocal jazz compositions. Primarily ensemble repertoire ranging from a cappella to full big band accompaniment. Opportunities for solo performances, student-driven arrangements, and to work with professional jazz artists. Practical sight-reading skills required; experience in improvisation preferred. Admission by audition.

*L. Jaye*

### **21M.445 Chamber Music Society**

Prereq: None

U (Fall, Spring)

0-4-2 units

Can be repeated for credit.

Study of chamber music literature through analysis, rehearsal, and performance. Weekly seminars and coaching. Open to string, piano, brass, woodwind players, and singers. Admission by audition.

*M. Thompson, N. Lin Douglas, J. Rife, F. Harris, K. Kaumeheiwā, L. Jaye*

### **21M.450 MIT Balinese Gamelan**

Prereq: None

U (Fall, Spring)

0-3-3 units

Can be repeated for credit.

A performing ensemble dedicated to the traditional music of Bali. Members of the ensemble study structures and techniques used on various gamelan instruments — such as gangsa (ancient bronze metallophones), suling (Balinese bamboo flute), reyong (bronze pots), gongs, and drums — and learn to perform gamelan pieces. Culminates in a performance. No previous experience required.

*G. Komin*

### **21M.451 Collaborative Piano**

Subject meets with 21M.514

Prereq: None

U (Fall, Spring)

Units arranged

Can be repeated for credit.

Open by audition to pianists, instrumentalists and singers who wish to explore and develop their talents as collaborative musicians. Students are paired based on availability and receive weekly coachings by appointment. Students practice independently, rehearse with their collaborator, attend their collaborator's lessons as needed, and perform at a juried recital at the end of the term. Students may register for 3 units for a smaller-scale assignment or 6 units for a larger-scale assignment or two small assignments. May satisfy the ensemble requirement for pianists and instrumentalists in the Emerson/Harris program at the discretion of the instructor. Students taking graduate version complete different assignments.

*M. Kim*

### **21M.460 MIT Senegalese Drum Ensemble**

Prereq: None

U (Fall, Spring)

0-3-3 units

Can be repeated for credit.

A performance ensemble focusing on the sabar drumming tradition of Senegal, West Africa. Study and rehearse Senegalese drumming techniques and spoken word. Perform in conjunction with MIT Rambax drumming group. No previous experience necessary, but prior enrollment in 21M.030 or 21M.293 strongly recommended. Limited to 30 by audition.

*L. Toure*

**21M.470 MIT Laptop Ensemble**

Subject meets with 21M.517  
 Prereq: Permission of instructor  
 U (Fall, Spring)  
 3-0-3 units  
 Can be repeated for credit.

The MIT Laptop Ensemble is a forum for the exploration of emerging digital musical practices, giving ensemble members hands-on experience with compositional and performance strategies based on current research. Concerts by the ensemble include repertoire drawn both from historical electronic and computer music compositions, as well as new compositions by invited composers. Also includes opportunities for ensemble members to compose for and conduct the ensemble. Weekly rehearsals focus on concepts drawn from a variety of 20th- and 21st-century practices, including experimental and improvised music, telematic performance, gestural controllers, multimedia performance, live coding, and interactive music systems. No previous experience required. Students taking graduate version complete different assignments. Admission by audition.

*I. Hattwick*

**21M.475 Music Performance**

Subject meets with 21M.511  
 Prereq: None  
 U (Fall, Spring)  
 1-2-3 units  
 Can be repeated for credit.

Designed for students who demonstrate considerable technical and musical skills and who wish to develop them through intensive private study. Students must take a weekly lesson, attend a regular performance seminar, participate in a departmental performing group, and participate in a group recital at the end of each term. Full-year commitment required. Information about lesson fees, scholarships, and auditions available in Music Section Office. Students taking graduate version complete different assignments. Admission by audition for Emerson/Harris Program.

*N. Lin Douglas, M. Thompson*

**21M.480 Advanced Music Performance**

Subject meets with 21M.512  
 Prereq: None  
 U (Fall, Spring)  
 1-2-6 units. HASS-A  
 Can be repeated for credit.

Designed for students who demonstrate considerable technical and musical skills and who wish to develop them through intensive private study. Students must take a weekly lesson, attend a regular performance seminar, and participate in a departmental performing group, and present a 50-minute solo recital at the end of the Spring term. Full-year commitment required. Information about lesson fees, scholarships, and auditions available in Music Section Office. Students taking graduate version complete different assignments. Admission by audition for the Emerson/Harris Program.

*N. Lin Douglas, M. Thompson*

**21M.490 Solo Recital**

Subject meets with 21M.525  
 Prereq: Permission of instructor  
 U (Spring)  
 1-2-6 units. HASS-A  
 Can be repeated for credit.

Solo 50-minute recital prepared with a private teacher and approved by the Emerson Private Studies Committee based on evidence of readiness shown in the Fall Term performances. See Music and Theater Arts website for application deadlines and conditions. Restricted to Emerson Scholars.

*N. Lin Douglas, M. Thompson, J. Rife*

**Advanced/Special Subjects****21M.500 Advanced Seminar in Music**

Prereq: Permission of instructor  
 U (Fall)  
 3-0-9 units. HASS-A  
 Can be repeated for credit.

Seminar that develops analytic and research skills in music history/culture or theory/composition. Topics vary, but are organized around a particular methodology, musical topic, or collection of works, that allow for application to a variety of interests and genres. Strong emphasis on student presentations, discussion, and a substantial writing project. May be repeated for credit with permission from instructor.

*Staff*

### **21M.505 Music Composition**

Subject meets with 21M.351

Prereq: 21M.304, 21M.310, or permission of instructor

G (Spring)

3-0-9 units

Can be repeated for credit.

Directed composition of original writing involving voices and/or instruments. Includes a weekly seminar in composition for the presentation and discussion of work in progress. Students are expected to produce at least one substantive work that will be performed in public by the end of the term. Contemporary compositions and major works from 20th-century music literature are studied. Students taking the graduate version complete different assignments.

*K. Mekan*

### **21M.511 Music Performance**

Subject meets with 21M.475

Prereq: None

G (Fall, Spring)

1-2-3 units

Can be repeated for credit.

Designed for students who demonstrate considerable technical and musical skills and who wish to develop them through intensive private study. Students must take a weekly lesson, attend a regular performance seminar, participate in a departmental performing group, and present a 50-minute solo recital at the end of the Spring term. Full-year commitment required. Information about lesson fees, scholarships, and auditions available in Music Section Office. Students taking graduate version complete different assignments. Admission by audition for Emerson/Harris Program.

*N. Lin Douglas, M. Thompson*

### **21M.512 Advanced Music Performance**

Subject meets with 21M.480

Prereq: None

G (Fall, Spring)

1-2-6 units

Can be repeated for credit.

Designed for students who demonstrate considerable technical and musical skills and who wish to develop them through intensive private study. Students must take a weekly lesson, attend a regular performance seminar, and participate in a departmental performing group, and present a 50-minute solo recital at the end of the Spring term. Full-year commitment required. Information about lesson fees, scholarships, and auditions available in Music Section Office. Students taking graduate version complete different assignments. Admission by audition for the Emerson/Harris Program.

*N. Lin Douglas, M. Thompson*

### **21M.514 Collaborative Piano**

Subject meets with 21M.451

Prereq: None

G (Fall, Spring)

Units arranged

Can be repeated for credit.

Open by audition to pianists, instrumentalists and singers who wish to explore and develop their talents as collaborative musicians. Students are paired based on availability and receive weekly coachings by appointment. Students practice independently, rehearse with their collaborator, attend their collaborator's lessons as needed, and perform at a juried recital at the end of the term. Students may register for 3 units for a smaller-scale assignment or 6 units for a larger-scale assignment or two small assignments. May satisfy the ensemble requirement for pianists and instrumentalists the Emerson/Harris program at the discretion of the instructor. Students taking graduate version complete different assignments.

*M. Kim*

### **21M.515 Vocal Repertoire and Performance**

Subject meets with 21M.410

Prereq: None

G (Spring)

3-0-3 units

Can be repeated for credit.

For the singer and/or pianist interested in collaborative study of solo vocal performance. Historical study of the repertoire includes listening assignments of representative French, German, Italian, and English works as sung by noted vocal artists of the genre. Topics include diction as facilitated by the study of the International Phonetic Alphabet; performance and audition techniques; and study of body awareness and alignment through the Alexander Technique and yoga. Admission by audition. Emerson Vocal Scholars contact department.

*R. Turner*

**21M.517 MIT Laptop Ensemble**

Subject meets with 21M.470

Prereq: None

G (Fall, Spring)

3-0-3 units

Can be repeated for credit.

The MIT Laptop Ensemble is a forum for the exploration of emerging digital musical practices, giving ensemble members hands-on experience with compositional and performance strategies based on current research. Concerts by the ensemble include repertoire drawn both from historical electronic and computer music compositions, as well as new compositions by invited composers. Also includes opportunities for ensemble members to compose for and conduct the ensemble. Weekly rehearsals focus on concepts drawn from a variety of 20th- and 21st-century practices, including experimental and improvised music, telematic performance, gestural controllers, multimedia performance, live coding, and interactive music systems. No previous experience required. Students taking graduate version complete different assignments. Admission by audition.

*I. Hattwick*

**21M.525 Solo Recital**

Subject meets with 21M.490

Prereq: None

G (Spring)

1-2-6 units

Can be repeated for credit.

Emerson Scholars may receive credit for a solo spring recital that has been prepared with and approved by the private teacher and the Emerson Private Studies Committee. Approval based on evidence of readiness shown in first term master classes. Restricted to Emerson Scholars.

*N. Lin Douglas, M. Thompson*

**21M.531 Independent Study in Music**

Prereq: Permission of instructor

U (Fall, IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Open to qualified students who wish to pursue independent studies or projects with members of the Music Section. Projects require prior approval by the Music and Theater Arts Chair.

*Consult Music Section Office*

**21M.533 Independent Study in Music**

Prereq: Permission of instructor

U (Fall, IAP)

Units arranged [P/D/F]

Can be repeated for credit.

Open to qualified students who wish to pursue independent studies or projects with members of the Music Section. Projects require prior approval by the Music and Theater Arts Chair.

*Consult Music Section Office*

**21M.540 Thinking about Music**

Prereq: Permission of instructor

G (Fall)

Not offered regularly; consult department

3-0-9 units

Seminar focusing on developing skills needed to navigate graduate research projects in music. Topics include how to engage with primary and secondary sources, library and archival (real and virtual) collections, and research bibliographies. Emphasizes working with diverse materials, and viewpoints. Ambiguity, uncertainty, and unsolved (and often unsolvable) questions in music research are emphasized. Includes brief overviews of major periods and works of Western Classical music and significant components and differences among three non-Western/non-Classical repertoires.

*Staff*

**21M.541 Harmony and Counterpoint I with Computational Applications**

Subject meets with 21M.301

Prereq: None. *Coreq: 21M.565 or permission of instructor*

G (Fall)

Not offered regularly; consult department

3-3-6 units

Explores Western diatonic music through regular composition and analysis assignments. Engages a broad range of historical periods, traditions, and individuals. Topics include rhythm and meter, harmony and counterpoint within a single key, and a brief overview of form and modulation. Individual skills are addressed through a variety of approaches, including the required piano and sight singing labs. Local musicians perform final composition projects. Students should be proficient in reading Western staff notation in at least one clef and have experience with key signatures and scales. Students taking the graduate version complete additional assignments. Limited to 18 per section.

*S. Iker, E. Ruehr*



### 21M.560 Introduction to Music Technology

Subject meets with 21M.080

Prereq: None

G (Fall, Spring)

3-0-9 units

Investigates how technology is used in the analysis, modeling, synthesis and composition of music, and its contribution to the artistic production practice. With an eye towards historical context as well as modern usage, topics include the physics of sound, digital representations of music, the Digital Audio Workstation (DAW), analog and digital synthesis techniques, MIDI and sequencing, electronic instrument design, notation software, generative music systems, and computational analysis of music. Weekly assignments focus on both theory and practice, requiring technical proficiency, creative output, and aesthetic consideration. Students taking graduate version complete different assignments. Enrollment limited.

*I. Hattwick*

### 21M.561 Electronic Music Composition I

Subject meets with 21M.361

Prereq: None

G (Fall, Spring)

2-1-9 units

Students develop basic skills in composition through weekly assignments focusing on sampling and audio processing. Source materials include samples of urban/natural environments, electronically generated sounds, inherent studio/recording noise, and pre-existing recordings. Audio processing includes digital signal processing (DSP) and analog devices. Covers compositional techniques, including mixing, algorithms, studio improvisation, and interaction. Students critique each other's work and give informal presentations on recordings drawn from sound art, experimental electronica, conventional and non-conventional classical electronic works, and popular music. Covers technology, math, and acoustics in varying detail. Students taking graduate version complete different assignments. Limited to 15 per section; preference to Music Technology graduate students, Music majors, minors, and concentrators.

*P. Whincop*

### 21M.562 Electronic Music Composition II

Subject meets with 21M.362

Prereq: 21M.361, 21M.561, or permission of instructor

G (Spring)

Not offered regularly; consult department

2-2-8 units

Explores sophisticated synthesis techniques, from finely tuned additive to noise filtering and distortion, granular synthesis to vintage emulation. Incorporates production techniques and use of multimedia, with guest lecturers/performers. Considers composing environments such as Max/MSP/Jitter, SPEAR, SoundHack, and Mathematica. Assignments include diverse listening sessions, followed by oral or written presentations, weekly sound studies, critiques, and modular compositions/soundscapes. Prior significant computer music experience preferred. Consult instructor for technical requirements. Students taking graduate version complete different assignments. Limited to 10.

*P. Whincop*

### 21M.S53, 21M.S54 Special Subject in Music

Prereq: Permission of instructor

Acad Year 2024-2025: U (Fall, Spring; second half of term)

Acad Year 2025-2026: Not offered

Units arranged

Can be repeated for credit.

Study of musical topics not covered in the regular subject listings, particularly experimental subjects offered by permanent or visiting faculty.

*Consult Music Office*

### 21M.S55 Special Subject in Music (New)

Prereq: None

U (IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Study of musical topics not covered in the regular subject listings, particularly experimental subjects offered by permanent or visiting faculty.

*Consult Music Office*

### 21M.S56 Special Subject in Music (New)

Prereq: None

U (IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Study of musical topics not covered in the regular subject listings, particularly experimental subjects offered by permanent or visiting faculty.

*Consult Music Office*

**Music and Media****21M.565 Programming for Music**

Prereq: Permission of instructor

G (Fall)

Not offered regularly; consult department

2-2-8 units

Introduction to programming skills needed for conducting research in music and music technology. Students develop skills to solve problems using python in music theory, history, performance, and technology and to compose using algorithms and data structures. Covers fundamental aspects of both computer science and software engineering as applied to music, including abstraction, data types, testing and debugging, time complexity, and recursion. Relies on students' prior experience with research methods in music and musical creativity to answer otherwise under-defined problems. Culminates in an individual programming project.

*Staff***21M.569 Studies in Music Technology**

Subject meets with 21M.369

Prereq: Permission of instructor

G (Fall)

3-0-9 units

Can be repeated for credit.

Explores various technologies in relation to musical analysis, composition, performance, culture, and quantitative methods. Topics vary each term and may include development and impact on society, generative and algorithmic music, recording techniques or procedural sound design. May involve hands-on components such as laptop music ensemble, new instrument building, or comparing the theory and practice of audio recording. Students taking graduate version complete different assignments. Limited to 16.

*I. Hattwick***21M.570 Digital Instrument Design**

Subject meets with 21M.370

Prereq: None

G (Spring)

3-6-3 units

Covers aesthetic and technical challenges in the creation of physical interfaces for musical performance. will engage in the design and creation of musical interfaces, and learn how to incorporate new technologies in their artistic practice. Topics covered include user experience design for artistic performance, musical human-computer interaction (HCI), hardware and software standards for digital musical systems, embedded programming and sound synthesis, analog and digital sensors, rapid prototyping and digital manufacturing, and creating performance practices around custom hardware. Students design and build their own digital musical instrument, and present a performance with the instrument as their final project. Students taking graduate version complete different assignments. Limited to 18.

*I. Hattwick***21M.572 Overview of Music Perception and Cognition**

Prereq: Permission of instructor

G (Fall; first half of term)

Not offered regularly; consult department

2-0-2 units

An overview of perceptual and biological structures of musical and auditory cognition with applications to music research. Differences between acoustical/technological and perceptual interpretations of sound and music are emphasized. Topics include musical memory and anticipation, emotion and psychological functions, and theories of music's origins and functions. Covers ethical and practical considerations of human subject research in music perception and important conclusions from the field. Not open to students who have taken HST.723[J] or HST.725.

*Staff***21M.573 Overview of Acoustics and the Physics of Sound**

Prereq: 21M.572 or permission of instructor

G (Fall; second half of term)

Not offered regularly; consult department

1-1-2 units

An overview of the physics of wave propagation, absorption, and reflection in sound. Topics include harmonic motion, standing waves in one to three dimensions, interference and distortion, loudness, electro-acoustical modeling, microphones and loudspeakers, and physical models of musical instruments. Laboratory time is spent in measuring and modeling local acoustical spaces, instruments, and sound production. Not open to students who have taken 2.066.

*Staff*

### **21M.574 Overview of Musical Software and Formats**

Prereq: None. Coreq: 21M.565 or permission of instructor

G (Fall; first half of term)

Not offered regularly; consult department

1-0-3 units

An overview of the practical side of working with music software and formats for research in music technology. Covers audio editing, notation software, and sound/signal tools primarily using open-source examples. Topics include: compression/codecs, command-line and batch operations for automation; translation among formats, differences among and between audio and symbolic formats (including wav, mp3, MIDI, MusicXML, and historic formats).

*Staff*

### **21M.576 Overview of Mathematics for Music Applications**

Prereq: None. Coreq: 21M.565 or permission of instructor

G (Fall; first half of term)

Not offered regularly; consult department

1-0-3 units

Overview of mathematical tools and their use in music research. Topics include linear algebra and matrices, applications of complex numbers and trigonometric functions, exponentials, summation functions, logarithmic domains, function composition, probability (including Bayes' Theorem), statistics (including tests of significance), and estimating complex functions computationally. All topics are presented in conjunction with musical applications.

*Staff*

### **21M.577 Overview of the Principles of Signals**

Prereq: 21M.576 and 21M.572; Coreq: 21M.573 or permission of instructor

G (Fall; second half of term)

Not offered regularly; consult department

1-1-2 units

Overview of signal processing techniques for music analysis in the audio domain, including their mathematical representations. Topics include sampling theory, filtering, convolution, and the Fourier transform, particularly in the discrete (digital) domain, with an emphasis on music applications and practice in Python.

*Staff*

### **21M.580[J] Musical Aesthetics and Media Technology**

Same subject as MAS.825[J]

Prereq: Permission of instructor

G (Fall)

Not offered regularly; consult department

3-3-6 units

See description under subject MAS.825[J].

*T. Machover*

### **21M.581[J] Projects in Media and Music**

Same subject as MAS.826[J]

Prereq: MAS.825[J]

G (Spring)

Not offered regularly; consult department

3-3-6 units

Can be repeated for credit.

See description under subject MAS.826[J].

*T. Machover*

### **21M.583 Computational Music Theory and Analysis**

Subject meets with 21M.383

Prereq: (21M.541 and 21M.565) or permission of instructor

G (Spring)

Not offered regularly; consult department

3-0-9 units

Covers major approaches to analyzing musical scores using computers. Topics include AI/machine learning of style, musical similarity, encoding, music composition, music perception, and big data repertory studies. Programming assignments given in Python. Culminates in an original final project. Students taking graduate version complete different assignments. Enrollment limited.

*M. Cuthbert*

### **21M.585 Interactive Music Systems**

Subject meets with 6.4550[J], 21M.385[J]

Prereq: (21M.541 and 21M.565) or permission of instructor

G (Fall, Spring)

3-0-9 units

Explores audio synthesis, musical structure, human computer interaction (HCI), and visual presentation for the creation of interactive musical experiences. Topics include audio synthesis; mixing and looping; MIDI sequencing; generative composition; motion sensors; music games; and graphics for UI, visualization, and aesthetics. Includes weekly programming assignments in python. Teams build an original, dynamic, and engaging interactive music system for their final project. Students taking graduate version complete different assignments. Limited to 36.

*E. Egozy*

**21M.587 Fundamentals of Music Processing**

Subject meets with 6.3020[J], 21M.387[J]

Prereq: (21M.541, 21M.565, and 21M.577) or permission of instructor  
G (Fall)

3-0-9 units

Analyzes recorded music in digital audio form using advanced signal processing and optimization techniques to understand higher-level musical meaning. Covers fundamental tools like windowing, feature extraction, discrete and short-time Fourier transforms, chromagrams, and onset detection. Addresses analysis methods including dynamic time warping, dynamic programming, self-similarity matrices, and matrix factorization. Explores a variety of applications, such as event classification, audio alignment, chord recognition, structural analysis, tempo and beat tracking, content-based audio retrieval, and audio decomposition. Students taking graduate version complete different assignments. Enrollment limited.

*E. Egozy*

**21M.589 Studies in Advanced Music Technology and Music Computation**

Prereq: (21M.540, 21M.565, and (21M.301 or 21M.541)) or permission of instructor

G (Spring)

Not offered regularly; consult department

3-0-9 units

Can be repeated for credit.

Studies of a selected topic in music technology requiring substantial prior knowledge of music studies, music technology, and computation. Topics vary. Examples include computational modeling of music cognition, artificial intelligence and musical creativity, or real-time Internet musical collaboration. May be repeated for credit with permission of instructor.

*Staff*

**21M.590 Colloquium in Music Technology**

Prereq: None

G (Fall, Spring)

Not offered regularly; consult department

1-0-0 units

Can be repeated for credit.

Presentations of recent work in music research from both academic and commercial spheres. Students prepare to engage with guest speakers by reading and demonstrating understanding of the sphere of work, attend presentations, and reflect on the work. Enrollment limited with priority to graduate students in music technology. May be repeated for credit with permission of the instructor.

*Staff*

**21M.591 Capstone Project in Music Technology**

Prereq: (21M.540, 21M.565, and (21M.301 or 21M.541)) or permission of instructor

G (Spring)

Not offered regularly; consult department

1-0-5 units

Preparation for and submission of the capstone project in the MASc in Music Technology. Provides an overview of expectations for the capstone project. Individual meetings with the research director/subject head and group meetings on the process of developing an idea from foundational music technology subjects with advanced topics learned simultaneously. Culminates in an individual research project and presentation. Restricted to MASc in Music Technology students.

*Staff*

**21M.595 Music Technology And Computation Research Seminar**

Prereq: None

G (Spring)

Not offered regularly; consult department

2-0-4 units

Development of a thesis-level project in music technology and computation. Individual meetings with the research director/subject head and with individual thesis advisors, together with group meetings on research techniques, musical thinking, and graduate-level academic writing. Culminates in a submitted prospectus for a graduate project presented to the group. Restricted to SM in Music Technology and Computation students.

*Staff*

**21M.S53, 21M.S54 Special Subject in Music**

Prereq: Permission of instructor

Acad Year 2024-2025: U (Fall, Spring; second half of term)

Acad Year 2025-2026: Not offered

Units arranged

Can be repeated for credit.

Study of musical topics not covered in the regular subject listings, particularly experimental subjects offered by permanent or visiting faculty.

*Consult Music Office*

### **21M.S55 Special Subject in Music (New)**

Prereq: None

U (IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Study of musical topics not covered in the regular subject listings, particularly experimental subjects offered by permanent or visiting faculty.

*Consult Music Office*

### **21M.S56 Special Subject in Music (New)**

Prereq: None

U (IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Study of musical topics not covered in the regular subject listings, particularly experimental subjects offered by permanent or visiting faculty.

*Consult Music Office*

### **21M.THG Directed Research and Thesis in Music Technology and Computation**

Prereq: None

G (Fall, IAP, Spring, Summer)

Not offered regularly; consult department

Units arranged

Can be repeated for credit.

Program of research and writing of the SM thesis in Music Technology and Computation. Structure and hours to be arranged by the student with the supervising committee. Restricted to SM in Music Technology and Computation students.

*Staff*

### **21M.THT Music Pre-Thesis Tutorial**

Prereq: Permission of instructor

U (Fall, IAP, Spring)

1-0-5 units

Can be repeated for credit.

Definition of and early-stage work on thesis project leading to undergraduate thesis in Music. Taken during the first term, or during IAP, of the student's two-term commitment to the thesis project. Student works closely with an individual faculty tutor. Limited to Music majors.

*Consult Music & Theater Arts Headquarters*

### **21M.THU Undergraduate Thesis**

Prereq: 21M.THT or permission of instructor

U (Fall, IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Completion of work on senior major thesis in Music under supervision of a faculty tutor. Includes oral presentation of thesis project early in the term, assembling and revising final text and meeting at the close with a committee of Music faculty evaluators to discuss successes and limitations of the project. Limited to Music majors.

*Consult Music & Theater Arts Headquarters*

### **21M.UR Undergraduate Research in Music**

Prereq: None

U (Fall, IAP, Spring, Summer)

Units arranged [P/D/F]

Can be repeated for credit.

Individual participation in ongoing Music research projects. For students in the Undergraduate Research Opportunities Program.

*Staff*

### **21M.URG Undergraduate Research in Music**

U (Fall, IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Individual participation in an ongoing music research project. For students in the Undergraduate Research Opportunities Program.

*Staff*

## **Theater Arts**

*The subjects listed below are arranged in three sections: Introductory, Intermediate, and Advanced Subjects.*

### **Advanced Subjects**

### **21M.THT Music Pre-Thesis Tutorial**

Prereq: Permission of instructor

U (Fall, IAP, Spring)

1-0-5 units

Can be repeated for credit.

Definition of and early-stage work on thesis project leading to undergraduate thesis in Music. Taken during the first term, or during IAP, of the student's two-term commitment to the thesis project. Student works closely with an individual faculty tutor. Limited to Music majors.

*Consult Music & Theater Arts Headquarters*

**21M.THU Undergraduate Thesis**

Prereq: 21M.THT or permission of instructor

U (Fall, IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Completion of work on senior major thesis in Music under supervision of a faculty tutor. Includes oral presentation of thesis project early in the term, assembling and revising final text and meeting at the close with a committee of Music faculty evaluators to discuss successes and limitations of the project. Limited to Music majors.

*Consult Music & Theater Arts Headquarters*

**21M.UR Undergraduate Research in Music**

Prereq: None

U (Fall, IAP, Spring, Summer)

Units arranged [P/D/F]

Can be repeated for credit.

Individual participation in ongoing Music research projects. For students in the Undergraduate Research Opportunities Program.

*Staff*

**21M.URG Undergraduate Research in Music**

U (Fall, IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Individual participation in an ongoing music research project. For students in the Undergraduate Research Opportunities Program.

*Staff*