

B. A. IN MUSIC PLUS A SECONDARY MAJOR IN PHYSICS

- The B.A. degree in Music requires 120 credits.
--66 hours must be non-music credits.
--40 hours must be 300 or 400-level courses.
--All music majors have Arts Event Attendance Requirements; for details, check <https://www.butler.edu/jca/for-current-students>.
- The double major of Music and Physics will fulfill the following Areas of Inquiry in the University Core Curriculum: Perspectives of the Creative Arts, The Natural World, and Analytic Reasoning. In addition, the B.A. Music curriculum fulfills the Butler Cultural Requirement because of the arts event attendance requirements for all arts majors. The Indianapolis Community Requirement is NOT satisfied.
- The student will be assigned a Physics advisor in addition to their Music advisor.

Semester 1

| | | |
|---|---------------------------|---|
| AM 021* | Keyboard Skills 1 | 1 |
| <i>*Piano majors substitute AM 031 and AM 032 plus two credits of music electives for AM 021,022,023,024.</i> | | |
| AM ____ | Major Instrument or Voice | 2 |
| ES ____ | Major Ensemble | 1 |
| MT 101 | Music Theory 1 | 3 |
| MT 111 | Aural Skills 1 | 1 |
| FYS 101 | First Year Seminar | 3 |
| WB ____ | Well-Being | 1 |
| MA 106* | Calculus & Anal. Geo. 1 | 4 |
| PH 490 | Colloquium | 0 |
| Language Elective | | 3 |

Explanation: 6 hours of the same language at the 200-level or higher are required.

TOTAL Credit Hours: 19

Semester 2

| | | |
|-------------------|------------------------------|---|
| AM 022 | Keyboard Skills 2 | 1 |
| AM ____ | Major Instrument or Voice | 2 |
| ES ____ | Major Ensemble | 1 |
| ME 330 | Self-Represent for Musicians | 1 |
| MT 102 | Music Theory 2 | 3 |
| MT 112 | Aural Skills 2 | 1 |
| FYS 102 | First Year Seminar | 3 |
| MA 107 | Calculus & Anal Geo. 2 | 4 |
| PH 490 | Colloquium | 0 |
| Language Elective | | 3 |

**Math placement test required; the student may need to take MA 101 (Algebra, 3 cr.) and/or MA 102 (Precalculus, 3 cr.) prior to MA 106. Students get credit for MA 106 if they receive a 4 or 5 on the Calculus AB AP exam; they receive credit for both MA 106 and MA 107 if they receive a 4 or 5 on the Calculus BC AP exam with a 4 or 5 on the AB subscore.*

Semester 3

| | | |
|---------|---------------------------|---|
| AM 023 | Keyboard Skills 3 | 1 |
| AM ____ | Major Instrument or Voice | 2 |
| ES ____ | Major Ensemble | 1 |
| MT 201 | Music Theory 3 | 3 |

Semester 4

| | | |
|---------|---------------------------|---|
| AM 024 | Keyboard Skills 4 | 1 |
| AM ____ | Major Instrument or Voice | 2 |
| ES ____ | Major Ensemble | 1 |
| MT 202 | Music Theory 4 | 3 |

| | | | | | |
|---------------------|-------------------------------|----|----------|-------------------------------|----|
| MT 211 | Aural Skills 3 | 1 | MT 212 | Aural Skills 4 | 1 |
| GHS ____ | Global and Historical Studies | 3 | GHS ____ | Global and Historical Studies | 3 |
| MA 208 | Calculus & Anal. Geo. 3 | 4 | MA 310 | Linear Algebra | 3 |
| PH 201 | Intro to Anal. Physics 1 | 5 | PH 202 | Intro to Anal. Physics 2 | 5 |
| PH 490 | Colloquium | 0 | PH 490 | Colloquium | 0 |
| TOTAL Credit Hours: | | 20 | | | 19 |

Semester 5

| | | |
|----------|---------------------------|---|
| AM ____ | Major Instrument or Voice | 2 |
| ES ____ | Major Ensemble | 1 |
| MH 305 | Music and Devotion | 3 |
| SW ____ | The Social World | 3 |
| AS 311** | Astrophysics 1 | 3 |
| PH 301 | Modern Physics | 3 |
| PH 331 | Electromagnetic Theory | 4 |
| PH 490 | Colloquium | 0 |

TOTAL Credit Hours: 19

Semester 6

| | | |
|----------|---------------------------|---|
| AM ____ | Major Instrument or Voice | 2 |
| ES ____ | Major Ensemble | 1 |
| MH 306 | Music and Narrative | 3 |
| MA 334 | Differential Equations | 3 |
| PH 303 | Electromag Waves & Optics | 3 |
| PH 311 | Experiment Modern Physics | 3 |
| PH 315** | Math Methods for Physics | 4 |
| PH 490 | Colloquium | 0 |

TOTAL Credit Hours: 19

**Not required for the Physics major, but recommended for students considering graduate school in Physics.

Semester 7

| | | |
|----------|---------------------------------|---|
| AM ____ | Major Instrument or Voice | 2 |
| ES ____ | Major Ensemble | 1 |
| MH 307 | Music, Globalization & Industry | 3 |
| TI ____ | Texts and Ideas | 3 |
| AS 340** | Cosmol & Extragal Astrophy | 3 |
| PH 421 | Quantum Theory | 4 |
| PH 461** | Computational Physics | 3 |
| PH 490 | Colloquium | 0 |
| PH 495 | Senior Seminar | 1 |

TOTAL Credit Hours: 20

Semester 8

| | | |
|------------|-----------------------------|---|
| AM ____ | Major Instrument or Voice | 2 |
| ES ____ | Major Ensemble | 1 |
| ME 430 | E-Portfolio Capstone | 0 |
| MH 308-SJD | Music and Movement | 3 |
| PH 321 | Inter Classical Mechanics | 4 |
| PH 325 | Therm & Statistical Physics | 4 |
| PH 422** | Quantum Theory 2 | 4 |
| PH 490 | Colloquium | 0 |

TOTAL Credit Hours: 18

**Not required for the Physics major, but recommended for students considering graduate school in Physics.

SUMMARY

REQUIRED MUSIC COURSES:

Note: The 8-semester sequence shown above includes 4 additional semesters of Applied Music (8 credits) and 2 additional semesters of Major Ensemble (2 credits), in addition to the courses listed below. While not required in the B.A. degree, most music majors will take these additional classes for scholarship reasons.

| | | |
|--|------------------------------------|--|
| AM 021,022,023,024 | Keyboard Skills 1,2,3,4 | 4 |
| <i>*Piano majors substitute AM 031 and AM 032 plus two credits of music electives.</i> | | |
| AM ____ | Major Instrument or Voice | 8 |
| ES ____ | Major Ensemble | 6 |
| ME 330 | Self-Representation for Musicians | 1 |
| ME 430 | E-Portfolio Capstone | 0 |
| MH 305 | Music and Devotion | 3 |
| MH 306 | Music and Narrative | 3 |
| MH 307 | Music, Globalization, and Industry | 3 |
| MH 308-SJD | Music and Movement | 3 |
| MT 101 | Music Theory 1 | 3 |
| MT 111 | Aural Skills 1 | 1 |
| MT 102 | Music Theory 2 | 3 |
| MT 112 | Aural Skills 2 | 1 |
| MT 201 | Music Theory 3 | 3 |
| MT 211 | Aural Skills 3 | 1 |
| MT 202 | Music Theory 4 | 3 |
| MT 212 | Aural Skills 4 | 1 |
| TOTAL | | 47 (plan shows 57 music credits per the note above) |

UNIVERSITY CORE CURRICULUM:

| | | |
|--------------|-------------------------------|-----------|
| FYS 101,102 | First Year Seminar | 3,3 |
| GHS ____ | Global and Historical Studies | 3,3 |
| SW ____ | The Social World | 3 |
| TI ____ | Texts and Ideas | 3 |
| WB ____ | Well-Being | 1 |
| TOTAL | | 19 |

COURSES REQUIRED FOR THE PHYSICS MAJOR:

NOTE: Many upper-level physics courses require one or more of the following math courses as prerequisites (included in the plan above):

| | | |
|---------|--|---|
| MA 106* | Calculus & Anal Geometry 1 | 4 |
| MA 107 | Calculus & Anal Geometry 2 | 4 |
| MA 208 | Calculus & Anal Geometry 3 | 4 |
| MA 310 | Linear Algebra | 3 |
| MA 334 | Differential Equations | 3 |
| PH 201 | Introduction to Analytical Physics 1 | 5 |
| PH 202 | Introduction to Analytical Physics 2 | 5 |
| PH 301 | Modern Physics | 3 |
| PH 303 | Electromagnetic Waves and Optics | 3 |
| PH 311 | Experimental Modern Physics | 3 |
| PH 321 | Intermediate Classical Mechanics | 4 |
| PH 325 | Thermodynamics and Statistical Physics | 4 |

| | | |
|-----------------------------------|---|--|
| PH 331 | Electromagnetic Theory | 4 |
| PH 421 | Quantum Theory | 4 |
| PH 490 | Colloquium (every semester) | 0 |
| PH 495 | Senior Seminar | 1 |
| TWO AS/PH Electives, chosen from: | | 6-8 |
| AS 301 | Modern Astronomical Tech with lab | 3 |
| AS 311 | Astrophysics 1 | 3 |
| AS 312 | Galactic Astrophysics 2 | 3 |
| AS 340 | Cosmology & Extragalactic Astrophysics | 3 |
| PH 315 | Mathematical Methods for Physics | 4 |
| PH 351 | Analog Electronics 1 | 4 |
| PH 422 | Quantum Theory 2 | 4 |
| PH 427 | General Relativity and Gravity 1 | 3 |
| PH 461 | Computational Physics | 3 |
| PH 480 | Special Topics | 3 |
| Language | 6 hours of the same language at the 200-level or higher | |
| TOTAL | | 48-50 (plus 18 additional math credits, if necessary) |

**Math placement test required; the student may need to take MA 101 (Algebra, 3 cr.) and/or MA 102 (Precalculus, 3 cr.) prior to MA 106. Students get credit for MA 106 if they receive a 4 or 5 on the Calculus AB AP exam; they receive credit for both MA 106 and MA 107 if they receive a 4 or 5 on the Calculus BC AP exam with a 4 or 5 on the AB subscore.*

Additional courses recommended for students going to graduate school in Physics (included in the plan above, and fulfill the AS/PH Elective requirement):

| | | |
|--------|--|---|
| AS 311 | Astrophysics 1 | 3 |
| AS 340 | Cosmology & Extragalactic Astrophysics | 3 |
| PH 315 | Mathematical Methods for Physics | 4 |
| PH 422 | Quantum Theory 2 | 4 |
| PH 461 | Computational Physics | 3 |