

# PHYSICS B.A. - ASTRONOMY

The astronomy concentration provides a thorough study of astronomy and astrophysics as well as a solid background in physics and mathematics. Graduates from this program have gone on to graduate programs in astronomy and astrophysics while others have found career opportunities at national astronomical observatories.

## Bachelor of Arts - Physics; Astronomy Concentration

### College of Humanities & Sciences

Degree Specific Credits: 69

Required Cumulative GPA: 2.0

Catalog Year: 2018-2019

### General Education Requirements

Information regarding these requirements can be found in the General Education Section (<http://catalog.umt.edu/academics/general-education-requirements>) of the catalog.

### Summary

Code	Title	Hours
	Lower-Division Physics Core	10
	Lower-Division Astronomy Core	4
	Upper-Division Physics Core	12
	Upper-Division Astronomy Core	9
	Major Electives	12
	Physics Electives	
	Physics Laboratory Electives	
	Math Requirements	16
	Computer Science Electives	3
	Advanced College Writing Requirement	3
	<b>Total Hours</b>	<b>69</b>

### Lower-Division Physics Core

Code	Title	Hours
	<b>Complete one of the following Physics sequences:</b>	<b>10</b>
	<b>Algebra- and Trigonometry-based Physics:</b>	
PHSX 205N	College Physics I	
& PHSX 206N	and College Physics I Laboratory	
PHSX 207N	College Physics II	
& PHSX 208N	and College Physics II Laboratory	
	<b>Calculus-based Physics (strongly recommended):</b>	
PHSX 215N	Fund of Physics w/Calc I	
& PHSX 216N	and Physics Laboratory I w/Calc	
PHSX 217N	Fund of Physics w/Calc II	
& PHSX 218N	and Physics Laboratory II w/Calc	
	<b>Total Hours</b>	<b>10</b>

Minimum Required Grade: C-

### Lower-Division Astronomy Core

**Rule:** Complete all of the courses in one of the two options. 4 total credits required.

#### Astronomy Core: Option 1

Code	Title	Hours
	<b>If option 1 is chosen, complete all of the following courses:</b>	
ASTR 132N	Stars, Galaxies, and the Universe	3
ASTR 135N	Stars, Galaxies, and the Universe Lab	1
	<b>Total Hours</b>	<b>4</b>

Minimum Required Grade: C-

#### Astronomy Core: Option 2

Code	Title	Hours
	<b>If option 2 is chosen, complete the following course:</b>	
ASTR 142N	The Evolving Universe	4
	<b>Total Hours</b>	<b>4</b>

Minimum Required Grade: C-

### Upper-Division Physics Core

Code	Title	Hours
	<b>Complete all of the following courses:</b>	
PHSX 301	Intro Theoretical Physics	3
PHSX 311	Oscillations and Waves	2
PHSX 343	Modern Physics	3
PHSX 461	Quantum Mechanics I	3
PHSX 499	Senior Capstone Seminar	1
	<b>Total Hours</b>	<b>12</b>

Minimum Required Grade: C-

### Upper-Division Astronomy Core

**Note:** In addition, ASTR 351 and ASTR 362 are recommended.

Code	Title	Hours
	<b>Complete all of the following courses:</b>	
ASTR 353	Galactic Astrophysics	3
ASTR 363	Stellar Astr & Astrophys I	3
ASTR 365	Stellar Ast & Astrophys II	3
	<b>Total Hours</b>	<b>9</b>

Minimum Required Grade: C-

### Major Electives

**Rule:** Complete the following subcategories of courses. 12 total credits required.

#### Physics Electives

Code	Title	Hours
	<b>Complete three of the following courses:</b>	<b>9</b>
ASTR 351	Planetary Science	
PHSX 320	Classical Mechanics	
PHSX 327	Optics	

PHSX 333	Computational Physics	
PHSX 423	Electricity & Magnetism I	
PHSX 425	Electricity & Magnetism II	
PHSX 446	Thermodyn & Stat Mech	
PHSX 451	Elementary Particle Physics	
PHSX 462	Quantum Mechanics II	
PHSX 491	Special Topics	
Total Hours		9

Minimum Required Grade: C-

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**Physics Laboratory Electives**

Code	Title	Hours
<b>Complete one of the following laboratory courses:</b>		<b>3</b>
ASTR 362	Observational Astronomy	
PHSX 323	Intermediate Physics Lab	
PHSX 444	Advanced Physics Lab	
Total Hours		3

Minimum Required Grade: C-

**Math Requirements****Note:** In addition, M 317, M 412, and M 418 are recommended.

Code	Title	Hours
<b>Complete all of the following courses:</b>		
M 171	Calculus I	4
M 172	Calculus II	4
M 221	Introduction to Linear Algebra	4
M 273	Multivariable Calculus	4
Total Hours		16

Minimum Required Grade: C-

**Computer Science Electives**

Code	Title	Hours
<b>Select one of the following courses:</b>		<b>3</b>
CSCI 100	Intro to Programming	
CSCI 135	Fund of Computer Science I	
PHSX 333	Computational Physics (strongly recommended)	
Total Hours		3

Minimum Required Grade: C-

**Advanced College Writing Requirement****Note:** May substitute another advanced writing course as approved by the department chair.

Code	Title	Hours
<b>Complete the following course:</b>		
PHSX 330	Communicating Physics	3
Total Hours		3