

# BACHELOR OF ARTS IN PHYSICS CURRICULUM GUIDE

Requirements effective for Fall 2020

The BA degree in physics requires a minimum of **38 credits in physics** (without PHY 100), CHY 121/123, ENG 101, and **15 credits in mathematics**. In addition, the student must take 60 credits of additional electives (18 of which are the minimum to satisfy the University's General Education requirements), for a total of 120 credits.

Below are two sample curricula, the first showing how a typical student can complete the requirements with physics courses spread out over four years, and the second designed for the student who decides to major in physics in the sophomore year. There are many other possible arrangements; usually the student will design an individualized program with an advisor from the Department of Physics and Astronomy.

## Sample #1 PHYSICS CURRICULUM

### FIRST YEAR

<u>FALL SEMESTER</u> Course Credits			<u>SPRING SEMESTER</u> Course Credits		
PHY 121	Physics for Engineers & Physical Scientists I	4	PHY 122	Physics for Engineers & Physical Scientists II	4
	<b>OR</b>	3		<b>OR</b>	4
PHY 111	General Physics I	4	PHY 112	General Physics II	6
ENG 101	College Composition Calculus I	1 3	MAT 127	Calculus II	
MAT 126	Intro to Physics & Astronomy	<b>15</b>		HV/SC & E Elective(s) <sup>1</sup> and/or Elective(s)	<b>14</b>
PHY 100	HV/SC & E Elective I <sup>1</sup>			<b>Total Credits</b>	

### SECOND YEAR

<u>FALL SEMESTER</u> Course Credits			<u>SPRING SEMESTER</u> Course Credits		
PHY 200	Career Prep in Phys & EP I	1	PHY 223	Special Relativity	1
PHY 236	Introductory Quantum Physics	3	PHY 231	Mathematical Methods in	2
PHY 261	Physical Measurements	2	PHY 241	Physics Computational	3
MAT 228	Laboratory Calculus III	4	PHY 262	Physics	3
CHY 121	Intro. to Chemistry	3	MAT 259	Electronics	3
CHY 123	Intro. to Chemistry Lab.	1		Differential Equations	3
	<b>Total Credits</b>	<b>14</b>		HV/SC & E Elective <sup>1</sup> or Elective <b>Total Credits</b>	<b>15</b>

### THIRD YEAR

<u>FALL SEMESTER</u> Course Credits			<u>SPRING SEMESTER</u> Course Credits		
PHY 364 <sup>2</sup>	Modern Experimental Physics	2	PHY 365 <sup>2</sup>	Mechanics Laboratory	2
PHY 451	Lab. Mechanics	3		Physics Elective	3
PHY 454	Electricity & Magnetism I	3		HV/SC & E Elective(s) <sup>1</sup> and/or Electives and/or Physics	9
	HV/SC & E Elective(s) <sup>1</sup> and/or Elective(s) and/or Physics	6		Elective(s) <b>Total Credits</b>	<b>14</b>
	<b>Total Credits</b>	<b>14</b>			

### FOURTH YEAR

<u>FALL SEMESTER</u> Course Credits			<u>SPRING SEMESTER</u> Course Credits		
PHY 400	Career Prep in Phys & EP II	1		HV/SC & E Elective(s) <sup>1</sup>	15
PHY 481	Project Lab in Phys. I	3		and/or Elective(s) and/or	
	HV/SC & E Elective(s) <sup>1</sup> and/or	12		Physics	
	Elective(s) and/or Physics			Elective(s)	
	Elective(s) <b>Total Credits</b>	<b>16</b>		<b>Total Credits</b>	<b>15</b>

**Minimum Total Credits in the BA in Physics Program: 120**

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The following curriculum is designed for those students who desire a degree in physics but who wish greater breadth in background in other areas of science—such as biological, chemical, earth, or environmental sciences. The program outlined below enables a student to begin a major in physics during the sophomore year.

### Sample #2 PHYSICS CURRICULUM

#### FIRST YEAR

<u>FALL SEMESTER</u> Course Credits			<u>SPRING SEMESTER</u> Course Credits		
ENG 101	College Composition	3		HV/SC & E Elective II <sup>1</sup>	3
	HV/SC & E Elective I <sup>1</sup>	3		Electives	12
	Electives	9			
	<b>Total Credits</b>	<b>15</b>		<b>Total Credits</b>	<b>15</b>

#### SECOND YEAR

<u>FALL SEMESTER</u> Course Credits			<u>SPRING SEMESTER</u> Course Credits		
PHY 200	Career Prep in Phys & EP I	1	PHY 122	Physics for Engineers & Physical Scientists II	4
PHY 121	Physics for Engineers & Physical Scientists I			<b>OR</b>	4
	<b>OR</b>	4	PHY 112	General Physics II	3
PHY 111	General Physics I		MAT 127	Calculus II	3
MAT 126	Calculus I	4		HV/SC & E Elective IV <sup>1</sup>	
CHY 121	Intro. to Chemistry	3		Elective	14
CHY 123	Intro. to Chemistry Lab.	1			
	HV/SC & E Elective III <sup>1</sup>	3			
	<b>Total Credits</b>	<b>16</b>		<b>Total Credits</b>	

#### THIRD YEAR

<u>FALL SEMESTER</u> Course Credits			<u>SPRING SEMESTER</u> Course Credits		
PHY 236	Intro. Quantum Physics	3	PHY 223	Special Relativity	1
PHY 261	Physical Measurements	2	PHY 231	Mathematical Methods in	2
PHY 472	Laboratory Geom. & Fourier	3	PHY 241	Physics Computational	3
MAT 228	Optics	4	PHY 262	Physics	3
	Calculus III	3	MAT 259	Electronics	3
	HV/SC & E Elective <sup>1</sup> or Elective			Differential Equations	3
	or Physics Elective			HV/SC & E Elective <sup>1</sup> or Elective	

	<b>Total Credits</b>	<b>15</b>	or Physics Elective <b>Total Credits</b>	<b>15</b>
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#### FOURTH YEAR

<u>FALL SEMESTER</u> Course Credits			<u>SPRING SEMESTER</u> Course Credits		
PHY 400	Career Prep in Phys & EP II	1	PHY 365 <sup>2</sup>	Mechanics Laboratory	2
PHY 364 <sup>2</sup>	Modern Experimental Physics	2		HV/SC & E Elective(s) <sup>1</sup> and/or	13
PHY 451	Lab. Mechanics	3		Electives and/or Physics	
PHY 454	Electricity & Magnetism I	3		Elective(s)	
PHY 481	Project Lab in Phys. I	3			
	HV/SC & E Elective <sup>1</sup> or Elective or Physics Elective	3			
	<b>Total Credits</b>	<b>15</b>		<b>Total Credits</b>	<b>15</b>

**Minimum Total Credits in the BA in Physics Program: 120**

#### Notes

- Human Values/ Social Context and Ethics (HV/SC & E), part of the University General Education Requirement, can be satisfied by a careful selection of at least six three-credit courses.

- Two writing intensive courses are required to satisfy the University's General Education Requirement. A student must choose one of the following options:
  - Take both PHY 364 and PHY 365;
  - Take either PHY 364 or PHY 365 and another writing intensive course.

#### Additional Program Requirements

- The 38 credits in physics (above PHY 100) must include PHY 121 and PHY 122 (or PHY 111 and PHY 112); PHY 200, PHY 223, PHY 236, PHY 261; PHY 241, PHY 262, PHY 231; PHY 364 (or PHY 365), PHY 451, PHY 454; PHY 400 and PHY 481. It must also include at least one 400-level course chosen from AST 451, PHY 447, PHY 455, PHY 463, PHY 469, PHY 470, PHY 472 and PHY 480. First-year students must also take PHY 100.
- The 15 credits of mathematics must include MAT 126, MAT 127, MAT 228, and MAT 259, or their equivalents.
- Elective courses must include
  - those necessary to satisfy the College of Liberal Arts and Sciences BA requirements, *including either a double major or a minor in addition to the Physics BA;*
  - 6 credits of approved science, engineering, or mathematics electives.
- A minimum of 72 hours must be outside the major.

## PHYSICS ELECTIVES

Course FALL SEMESTER		Credits
PHY 469	Quantum & Atomic Physics	3
PHY 472	Geometric and Fourier Optics	3
PHY 473	Modern Optics Laboratory	1-2
PHY 480	Physics of Materials	3
PHY 496	Field Experience in Physics	1-6
PHY 501	Mechanics (graduate)	3
PHY 574	Methods of Mathematical Physics (graduate)	3
AST 451	Astrophysics I (typically offered in the spring semester)	1-3
Course SPRING SEMESTER Credits		
PHY 224	Special Relativity Laboratory	1-3
PHY 447	Molecular Biophysics	3
PHY 455	Electricity and Magnetism II	3
PHY 463	Statistical Mechanics	3
PHY 470	Nuclear Physics	2
PHY 471	Nuclear Physics Laboratory	1
PHY 496	Field Experience in Physics	1-6
AST 451	Astrophysics I (typically offered in the spring semester)	1-3

A student preparing for graduate work in physics is advised to take some or all of the following electives in his or her junior or senior year: PHY 463, Statistical Mechanics; PHY 470, Nuclear Physics; PHY 480, Physics of Materials; as well as additional courses in mathematics.

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### BACHELOR OF ARTS IN PHYSICS STUDENT RECORD

#### CR DATE GRADE CR DATE GRADE

PHY 100 1 \_\_\_\_\_  
 PHY 121 4 \_\_\_\_\_ MAT 126 4 \_\_\_\_\_ (or PHY 111) MAT 127 4 \_\_\_\_\_ PHY  
 122 4 \_\_\_\_\_ MAT 228 4 \_\_\_\_\_ (or PHY 112) MAT 259 3 \_\_\_\_\_  
 PHY 200 1 \_\_\_\_\_ MAT \_\_\_\_\_ PHY 223 1 \_\_\_\_\_ MAT \_\_\_\_\_  
 \_\_\_\_\_ PHY 231 3 \_\_\_\_\_ (or PHY 574 3 \_\_\_\_\_) PHY 236 3 \_\_\_\_\_  
 PHY 241 3 \_\_\_\_\_ **SUBTOTAL** (15 credits minimum) PHY 261 2 \_\_\_\_\_  
 PHY 262 2 \_\_\_\_\_  
 PHY 364 2 \_\_\_\_\_ **GEN ED REQUIREMENTS** (AREA) (or PHY 365) CR DATE GRADE PHY 400 1  
 \_\_\_\_\_ 1 \_\_\_\_\_ PHY 451 3 \_\_\_\_\_ 2 \_\_\_\_\_  
 PHY 454 3 \_\_\_\_\_ 3 \_\_\_\_\_ PHY 481 3 \_\_\_\_\_ 4 \_\_\_\_\_  
 \_\_\_\_\_ PHY \_\_\_\_\_ 5 \_\_\_\_\_ PHY \_\_\_\_\_ 6  
 \_\_\_\_\_ PHY \_\_\_\_\_ 7 \_\_\_\_\_ PHY \_\_\_\_\_

**SUBTOTAL** (18 credits minimum)

**SUBTOTAL** (38 credits minimum)

without PHY 100) GEN ED AREAS:

**ELECTIVES** (must satisfy BA requirements a. Western Cultural Tradition in CLAS and 6 in science) b. Social Contexts & Institutions

Sci c. Cultural Diversity & International Perspectives Elec \_\_\_\_\_ d. Population & the Environment \_\_\_\_\_ e. Artistic and Creative Expression \_\_\_\_\_ f. Ethics

Free

Elec \_\_\_\_\_ **Writing requirement satisfied by** \_\_\_\_\_

\_\_\_\_\_ and \_\_\_\_\_

**OTHER COURSES**

\_\_\_\_\_ **CR DATE GRADE** \_\_\_\_\_ CHY 121 3 \_\_\_\_\_

\_\_\_\_\_ CHY 123 1 \_\_\_\_\_ ENG 101 3 \_\_\_\_\_

**SUBTOTAL** \_\_\_\_\_

**DEGREE REQUIREMENTS** \_\_\_\_\_

Total credits must be 120 or greater.

**SUBTOTAL**

**TOTAL ALL = Credits outside of major = (72 credits minimum)**

**TOTAL GPA IN MAJOR = TOTAL GPA =  
(2.00 MINIMUM) (2.00 MINIMUM)**