

# PHYSICS, B.S./M.S.

**Credits:** 152: 122UG/30GD  
**CIP Code:** 400801

## Program Description

The Accelerated Dual Degrees in Bachelor of Science and Master of Science in Physics curriculum provide graduates an understanding of basic and advanced principles of physics together with the knowledge of analytical, computational, and mathematical concepts to solve complex scientific problems of importance to the society. The flexibility of the curriculum provides opportunities for the development of initiatives and skills for careers in research and technology.

## Admissions Requirements

Applicants to the Accelerated Dual Degrees in Bachelor of Science and Master of Science in Physics must meet the General Admissions Requirements of Clark Atlanta University as published in the Undergraduate and Graduate Catalogs. Students are admitted based on their academic achievement in secondary school. Students must have a minimum cumulative high school grade point average of 3.25 and minimum scores of 1100 on the composite Scholastic Assessment Test (SAT) out of 1600 or 22 on the American College Testing (ACT) out of 36.

## Student Learning Outcomes

Graduates with a Bachelor of Science and Master of Science in Physics will be able to:

1. Solve calculus-based problems in mechanics, electromagnetism, and optics.
2. Integrate physical concepts for the analysis of complex problems cutting across multidisciplinary STEM areas.
3. Analyze and model physical systems by utilizing mathematical approximations and methods.
4. Effectively communicate concepts of related physics topics phenomena, analyses, and conclusions.

## Degree Requirements

In addition to the General Degree Requirements as published in the Undergraduate and Graduate Catalogs, students must satisfy all the requisite major and cognate courses with minimum final grades of "C" for award of the Bachelor of Science Degree in Physics. For award of the Master of Science Degree in Physics, students must complete at least thirty (30) credits of graduate coursework in the major field and defend an acceptable thesis.

At the beginning of the second semester of the third year of study, students must apply for admission to the graduate program. During their fourth year of study, students may begin graduate coursework and research while completing undergraduate degree requirements. Summer research activities may be required depending on the objectives of students' research projects. During the fifth year of study, students engage exclusively in graduate study.

Students must maintain a minimum cumulative grade point average of 3.0 to continue in the program. At any point during matriculation in this program, students may elect to pursue the traditional Bachelor of Science Degree in Physics.

Code	Title	Hours
<b>Required Undergraduate Courses</b>		
CPHY 121	Physics I: Mechanics	3
CPHY 121L	Physics I: Mechanics Lab	1
CPHY 122	Physics II: Elec & Magnetism	3
CPHY 122L	Physics II:Electricity&Mag.Lab	1
CPHY 123	Physics III:Optics/Modern Phys	3
CPHY 123L	Physics III: Optics&Mod.PhyLab	1
CPHY 211	Modern Physics	3
CPHY 321	Mathematical Physics I	3
CPHY 322	Mathematical Physics II	3
CPHY 331	Classical Mechanics	3
CPHY 332	Electromagnetic Theory	3
CPHY 411	Thermo & Statistical Mechanics	3
CPHY 412	Intro to Quantum Mechanics	3
CPHY 421	Undergraduate Research I	3
CPHY 422	Undergraduate Research II	3
CPHY XXX	Physics Elective <sup>1</sup>	3
CPHY XXX	Physics Elective <sup>1</sup>	3
CPHY XXX	Physics Elective <sup>1</sup>	3
<b>Undergraduate Physics Electives</b>		
Select nine credits of the following:		9
CPHY 301		
CPHY 312		
CPHY 341		
CPHY 375		
CPHY 441	Internship	
CPHY 442		
CPHY 450		
<b>Cognate Courses</b>		
CCIS 253	Intro. to Comp. Sim/Analysis	3
CMAT 111	Calculus I	4
CMAT 112	Calculus II	4
CMAT 211	Calculus III	4
CMAT 214	Linear Algebra	3
CMAT 212	Differential Equations	3
<b>Total Hours</b>		<b>78</b>

<sup>1</sup> Physics Electives must be at the 300-400 level.

## General Education Courses

Code	Title	Hours
<b>Area A: Humanities/Fine Arts</b>		
CPHI 105	Critical Thinking	3
CHIS 201	United States,Africa & World	3
or CHIS 211	History of the United States	
CHIS 202	United States, Africa & World	3
or CHIS 212	History of the United States	
<b>Area B: Social/Behavioral Sciences</b>		
CPSY 211	General Psychology	3
<b>Area C: Natural Sciences/Mathematics/Statistics</b>		
CCHE 111	Gen Chem 1 & Recitation	4

CCHE 111L	General Chemistry Lab	0
CCHE 111R		0
CCHE 112	Gen Chem II Lec & Recitation	4
CCHE 112HL	Honors General Chemistry Lab	0
CCHE 112HR		0
<b>Area D: Communications</b>		
CENG 105	College Composition I	3
CENG 106	College Composition II	3
CENG 201	Intro to World Literature I	3
or CENG 202	Intro to World Literature II	
<b>Area E: Financial/Technological</b>		
CCIS 105 & 105L	Programming Principles I and Programming Principles I Lab	4
CECO 107	Introduction to Economics	3
<b>Total Hours</b>		<b>36</b>

**Free Electives:** 15 Credits

**Note:** Free Electives should be chosen in consultation with the advisor depending, on the choice of minor or stackable credentials.

## Other University Requirements

Code	Title	Hours
CGED 100	First Year Seminar	1
CGED 101	1st-Year Seminar	1
<b>Total Hours</b>		<b>2</b>

## Graduate Courses

Code	Title	Hours
<b>Required Graduate Courses</b>		
CPHY 501	Classical Mechanics	3
CPHY 503	Electrodynamics	3
CPHY 515	Quantum Mechanics I	3
CPHY 516	Quantum Mechanics II	3
CPHY 520	Thermo & Statistical Mechanics	3
CPHY 531	Mathematical Methods I	3
CPHY 532	Mathematical Methods II	3
CPHY 603	Thesis Research (I)	3
CPHY 603	Thesis Research (II)	3
CPHY XXX	Physics Elective <sup>1</sup>	3
<b>Graduate Elective</b>		
Select one of the following:		3
CPHY 504		
CPHY 540	Solid State Physics	
CPHY 545		
CPHY 550		
CPHY 565	Physics of Surfaces	
CPHY 570		
CPHY 585		
CPHY 586		
CPHY 604	Thesis Consultation	
CPHY 605		
CPHY 606		

CPHY 607		
CPHY 610		
CPHY 615	Special Topics in Physics	
<b>Total Hours</b>		<b>33</b>

## Plan of Study for Accelerated Dual Degrees in Physics, B.S./M.S.

(Students who are **not** prepared to complete calculus in their first year of study should arrange a revised plan of study in consultation with an advisor.)

Course	Title	Hours
<b>First Year</b>		
<b>First Semester</b>		
CPHI 105	Critical Thinking (Area A)	3
CENG 105	College Composition I (Area D)	3
CGED 100	First Year Seminar	1
CMAT 111	Calculus I	4
CPHY 121	Physics I: Mechanics	3
CPHY 121L	Physics I: Mechanics Lab	1
<b>Hours</b>		<b>15</b>
<b>Second Semester</b>		
CCIS 105 & 105L	Programming Principles I and Programming Principles I Lab (Area E)	4
CENG 106	College Composition II (Area D)	3
CGED 101	1st-Year Seminar	1
CMAT 112	Calculus II	4
CPHY 122	Physics II: Elec & Magnetism	3
CPHY 122L	Physics II:Electricity&Mag.Lab	1
<b>Hours</b>		<b>16</b>
<b>Second Year</b>		
<b>First Semester</b>		
CCIS 253 & CCIS 106L	Intro. to Comp. Sim/Analysis and Programming Principles II Lab	3
CCHE 111	Gen Chem 1 & Recitation (Area C)	4
CCHE 111L	General Chemistry Lab (Area C)	0
CCHE 111R	Area C	0
CMAT 211	Calculus III	4
CPHY 123	Physics III:Optics/Modern Phys	3
CPHY 123L	Physics III: Optics&Mod.PhyLab	1
<b>Hours</b>		<b>15</b>
<b>Second Semester</b>		
CENG 201 or CENG 202	Intro to World Literature I (Area D) or Intro to World Literature II	3
CCHE 112	Gen Chem II Lec & Recitation (Area C)	4
CCHE 112L	General Chemistry II Lab (Area C)	0
CCHE 112R	Area C	0
CMAT 212	Differential Equations	3
CPHY 211	Modern Physics	3
CPSY 211	General Psychology	3
<b>Hours</b>		<b>16</b>

**Third Year****First Semester**

CHIS 201 or CHIS 211	United States, Africa & World (Area A) or History of the United States	3
CMAT 214	Linear Algebra	3
CPHY 321	Mathematical Physics I	3
CPHY 331	Classical Mechanics	3
Free Elective <sup>1</sup>		3
<b>Hours</b>		<b>15</b>

**Second Semester**

CHIS 202 or CHIS 212	United States, Africa & World (Area A) or History of the United States	3
CPHY 322	Mathematical Physics II	3
CPHY 332	Electromagnetic Theory	3
CECO 107	Introduction to Economics (Area E)	3
Free Elective <sup>1</sup>		3
<b>Hours</b>		<b>15</b>

**Fourth Year****First Semester**

CPHY 411	Thermo & Statistical Mechanics	3
CPHY 412	Intro to Quantum Mechanics	3
CPHY 421	Undergraduate Research I	3
CPHY XXX	Physics Elective <sup>2</sup>	3
Free Elective <sup>1</sup>		3
CPHY 501	Classical Mechanics	3
<b>Hours</b>		<b>18</b>

**Second Semester**

CPHY 422	Undergraduate Research II	3
CPHY XXX	Physics Elective <sup>2</sup>	3
CPHY XXX	Physics Elective <sup>2</sup>	3
Free Elective <sup>1</sup>		3
Free Elective <sup>1</sup>		3
CPHY 503	Electrodynamics	3
<b>Hours</b>		<b>18</b>

**Fifth Year****First Semester**

CPHY 515	Quantum Mechanics I	3
CPHY 520	Thermo & Statistical Mechanics	3
CPHY 531	Mathematical Methods I	3
CPHY 601	Departmental Seminar	0
CPHY 603	Thesis Research	3
<b>Hours</b>		<b>12</b>

**Second Semester**

CPHY 516	Quantum Mechanics II	3
CPHY 532	Mathematical Methods II	3
CPHY 602	Departmental Seminar	0
CPHY 603	Thesis Research	3
CPHY XXX	Physics Elective <sup>2</sup>	3
<b>Hours</b>		<b>12</b>

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**Total Hours** **152**

<sup>2</sup> Undergraduate Physics Electives must be at the 300-400 level and Graduate Elective must be at the 500 level and above.

<sup>1</sup> Free Electives should be chosen in consultation with the advisor, depending on the choice of minor or stackable credentials.