

# PHYSICS - B.A.

## College of Arts and Sciences

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## Description

The Bachelor of Arts degree in Physics prepares students for such varied fields as secondary education, patent law, science journalism or interdisciplinary science careers. The core requirements permit a large number of elective courses, which allow students to complete a minor or second major in preparation for an interdisciplinary career. This program is well suited for those with a strong interest not only in science but also in a non-science field. Students completing the program may choose to continue their physics studies on a graduate level.

## Fully Offered At:

- Kent Campus

## Admission Requirements

The university affirmatively strives to provide educational opportunities and access to students with varied backgrounds, those with special talents and adult students who graduated from high school three or more years ago.

**Freshman Students on the Kent Campus:** The freshman admission policy on the Kent Campus is selective. Admission decisions are based upon the following: cumulative grade point average, ACT and/or SAT scores, strength of high school college preparatory curriculum and grade trends. The Admissions Office at the Kent Campus may defer the admission of students who do not meet admissions criteria but who demonstrate areas of promise for successful college study. Deferred applicants may begin their college coursework at one of seven regional campuses of Kent State University. For more information on admissions, including additional requirements for some academic programs, visit the admissions website for new freshmen.

**Freshman Students on the Regional Campuses:** Kent State campuses at Ashtabula, East Liverpool, Geauga, Salem, Stark, Trumbull and Tuscarawas, as well as the Regional Academic Center in Twinsburg, have open enrollment admission for students who hold a high school diploma, GED or equivalent.

### English Language Proficiency Requirements for International Students:

All international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning a minimum 525 TOEFL score (71 on the Internet-based version), minimum 75 MELAB score, minimum 6.0 IELTS score or minimum 48 PTE score, or by completing the ESL level 112 Intensive Program. For more information on international admission, visit the Office of Global Education's admission website.

**Transfer, Transitioning and Former Students:** For more information about admission criteria for transfer, transitioning and former students, please visit the admissions website.

## Program Learning Outcomes

Graduates of this program will be able to:

1. Demonstrate the technical and cognitive skills important in a good physicist, including the following:
  - a. Think critically and analytically.
  - b. Define a problem and how to solve problems.
  - c. Understand advanced mathematics (e.g., calculus and differential equations) and computer skills.
  - d. Use, design and even build lab equipment.
2. Demonstrate the traits important in a good scientist, namely, hard working, creative, meticulous, persistence, tenacious and self confidence.
3. Communicate results of their work to peers, to their instructors or supervisors, to various target groups within the physics community and to people outside the discipline.

## University Requirements

All students in a bachelor's degree program at Kent State University must complete the following university requirements for graduation.

**NOTE:** University requirements may be fulfilled in this program by specific course requirements. Please see Program Requirements for details.

Destination Kent State: First Year Experience	1
Course is not required for students with 25 transfer credits, excluding College Credit Plus, or age 21+ at time of admission.	
Diversity Domestic/Global (DIVD/DIVG)	2 courses
Students must successfully complete one domestic and one global course, of which one must be from the Kent Core.	
Experiential Learning Requirement (ELR)	varies
Students must successfully complete one course or approved experience.	
Kent Core (see table below)	36-37
Writing-Intensive Course (WIC)	1 course
Students must earn a minimum C grade in the course.	
Upper-Division Requirement	39 (or 42)
Students must successfully complete 39 upper-division (numbered 30000 to 49999) credit hours to graduate. Students in a B.A. and/or B.S. degree in the College of Arts and Sciences must complete 42 upper-division credit hours.	
Total Credit Hour Requirement	120
Some bachelor's degrees require students to complete more than 120 credit hours.	

## Kent Core Requirements

Kent Core Composition (KCMP)	6
Kent Core Mathematics and Critical Reasoning (KMCR)	3
Kent Core Humanities and Fine Arts (KHUM/KFA) (min one course each)	9
Kent Core Social Sciences (KSS) (must be from two disciplines)	6
Kent Core Basic Sciences (KBS/KLAB) (must include one laboratory)	6-7
Kent Core Additional (KADL)	6
<b>Total Credit Hours:</b>	<b>36-37</b>

## Program Requirements

### Major Requirements

[BA-PHY]

Code	Title	Credit Hours
<b>Major Requirements (courses count in major GPA)</b>		
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
MATH 32051	MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I	4
MATH 32052	MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II	4
PHY 12000	INTRODUCTORY PHYSICS SEMINAR (ELR)	1
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB) <sup>1</sup>	5
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB) <sup>1</sup>	5
PHY 30020	INTERMEDIATE PHYSICS LABORATORY (WIC) <sup>2</sup>	2
PHY 35101	CLASSICAL MECHANICS	4
PHY 36001	INTRODUCTORY MODERN PHYSICS	3
PHY 36002	APPLICATIONS OF MODERN PHYSICS	3
PHY 40020	ADVANCED PHYSICS LABORATORY (WIC) <sup>2</sup>	2
PHY 45201	ELECTROMAGNETIC THEORY	4
Physics Upper-Division Electives (PHY 30000 or 40000 level) <sup>3</sup>		
<b>Additional Requirements (courses do not count in major GPA)</b>		
UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
Foreign Language <sup>4</sup>		14-16
Kent Core Composition		6
Kent Core Humanities and Fine Arts (minimum one course from each)		9
Kent Core Social Sciences (must be from two disciplines)		6
Kent Core Additional		6
College General Requirement (must be from Kent Core Basic Sciences) <sup>5</sup>		3
College General Requirement (must be from Kent Core Social Sciences) <sup>6</sup>		3
General Electives (total credit hours depends on earning 120 credit hours, including 42 upper-division credit hours)		17
Minimum Total Credit Hours:		120

<sup>1</sup> Credit is not granted for both the PHY 13001/PHY 13002 and the PHY 23101/PHY 23102 series.

<sup>2</sup> A minimum C grade must be earned in one of the courses to fulfill writing-intensive requirement.

<sup>3</sup> With advisor's permission, students may replace 3 credit hours of physics electives with ENG 20002 or PHIL 41035.

<sup>4</sup> Fulfills College General Requirement.

<sup>5</sup> One additional course taken from the Kent Core Basic Science courses in the following Arts and Sciences disciplines: Anthropology (ANTH), Biological Sciences (BSCI), Chemistry (CHEM), Geography (GEOG), Geology (GEOL) or Physics (PHY). Students may take the courses listed in the "introductory" sequences with the restrictions noted above in the Kent Core Basic Science section. The course may not be from the student's major.

<sup>6</sup> One additional course taken from the Kent Core Social Sciences courses in the following Arts and Sciences disciplines: Anthropology (ANTH), Applied Conflict Management (CACM), Geography (GEOG), Criminology and Justice Studies (CRIM), Political Science (POL), Psychology (PSYC) or Sociology (SOC). The course may not be from the student's major.

### Graduation Requirements

Minimum Major GPA	Minimum Overall GPA
2.000	2.000

- The following courses may not count towards the Physics major requirements:

Code	Title	Credit Hours
PHY 11030	SEVEN IDEAS THAT SHOOK THE UNIVERSE (KBS)	3
PHY 21040	PHYSICS IN ENTERTAINMENT AND THE ARTS (KBS)	3
PHY 21041	PHYSICS IN ENTERTAINMENT AND THE ARTS LABORATORY (KBS) (KLAB)	1
PHY 21430	FRONTIERS IN ASTRONOMY (KBS)	3
PHY 21431	FRONTIERS IN ASTRONOMY LABORATORY (KBS) (KLAB)	1

### Foreign Language College Requirement

Students pursuing the Bachelor of Arts degree in the College of Arts and Sciences must complete 14-16 credit hours of foreign language.<sup>1</sup> To complete the requirement, students have the equivalent of Elementary I and II in any language, plus one of the following options:

- Intermediate I and II of the same language<sup>2</sup>
- Elementary I and II of a second language
- Any combination of two courses from the following list:

- Intermediate I of the same language
- MCLS 10001 INTRODUCTION TO STRUCTURAL CONCEPTS FOR LANGUAGE STUDENTS
- MCLS 20000 GLOBAL LITERACY AND CULTURAL AWARENESS
- MCLS 20091 VARIABLE CONTENT SEMINAR IN GLOBAL LITERACY: CASE STUDIES
- MCLS 21417 MULTICULTURALISM IN TODAY'S GERMANY (DIVG)
- MCLS 22217 DIVERSITY IN TODAY'S RUSSIA (DIVG)
- MCLS 23217 THE FRANCOPHONE EXPERIENCE (DIVG)
- MCLS 28404 THE LATIN AMERICAN EXPERIENCE (DIVG)
- MCLS 28405 THE SPANISH EXPERIENCE (DIVG)

- <sup>1</sup> All students with prior foreign language experience should take the foreign language placement test to determine the appropriate level at which to start. Some students may begin beyond the Elementary I level and will complete the requirement with fewer credit hours and fewer courses. This may be accomplished by (1) passing a course beyond Elementary I through Intermediate II level; (2) receiving credit through Credit by Exam (CBE), Advanced Placement (AP), International Baccalaureate (IB) or College Level Examination Program (CLEP); or (3) being designated a "native speaker" of a non-English language (consult with the College of Arts and Sciences Advising Office for additional information). When students complete the requirement with fewer than 14 credit hours and four courses, they will complete remaining credit hours with general electives.
- <sup>2</sup> Certain majors, concentrations and minors may require specific languages, limit the languages from which a student may choose or require coursework through Intermediate II. Students who plan to pursue graduate study may need particular language coursework.

## Roadmap

This roadmap is a recommended semester-by-semester plan of study for this major. However, courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

Course	Title	Credits
<b>Semester One</b>		
! MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
! PHY 12000	INTRODUCTORY PHYSICS SEMINAR (ELR)	1
UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
Foreign Language		4
Kent Core Requirement		3
Credit Hours		14
<b>Semester Two</b>		
! MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
! PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
Foreign Language		4
Credit Hours		14
<b>Semester Three</b>		
! MATH 32051	MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I	4
! PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
Foreign Language		3
College General Requirement		3
Credit Hours		15
<b>Semester Four</b>		
! MATH 32052	MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II	4
! PHY 36001	INTRODUCTORY MODERN PHYSICS	3
Foreign Language		3
Kent Core Requirement		3
Kent Core Requirement		3
Credit Hours		16
<b>Semester Five</b>		
! PHY 30020	INTERMEDIATE PHYSICS LABORATORY (WIC)	2
! PHY 35101	CLASSICAL MECHANICS	4
! PHY 36002	APPLICATIONS OF MODERN PHYSICS	3
Kent Core Requirement		3
College General Requirement		3
Credit Hours		15
<b>Semester Six</b>		
Physics Upper-Division Elective (PHY 30000 or 40000 level)		3
Kent Core Requirement		3
Kent Core Requirement		3
Kent Core Requirement		3
General Elective		3
Credit Hours		15
<b>Semester Seven</b>		
! PHY 40020	ADVANCED PHYSICS LABORATORY (WIC)	2
! PHY 45201	ELECTROMAGNETIC THEORY	4
Kent Core Requirement		3
Kent Core Requirement		3
General Elective		3
Credit Hours		15
<b>Semester Eight</b>		
Physics Upper-Division Electives (PHY 30000 or 40000 level)		5

General Electives	11
Credit Hours	16
Minimum Total Credit Hours:	120