

PHYSICS - B.S.

College of Sciences and Humanities

Department of Physics

www.kent.edu/physics

About This Program

The Bachelor of Science in Physics program is designed for students who want to pursue a career in physics or a related field. With a rigorous curriculum that includes advanced coursework in classical mechanics, electromagnetism, quantum mechanics and more, this program provides you with the knowledge and skills needed to succeed in graduate school or the workforce. Read more...

Contact Information

- **Almut Schroeder** | aschroe2@kent.edu | 330-672-3044
- Speak with an Advisor
- Chat with an Admissions Counselor

Program Delivery

- **Delivery:**
 - In person
- **Location:**
 - 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.

First-Year Students on the Kent Campus: First-year admission policy on the Kent Campus is selective. Admission decisions are based upon cumulative grade point average, strength of high school college preparatory curriculum and grade trends. Students not admissible to the Kent Campus may be administratively referred to one of the seven regional campuses to begin their college coursework. For more information, visit the admissions website for first-year students.

First-Year Students on the Regional Campuses: First-year admission to Kent State's campuses at Ashtabula, East Liverpool, Geauga, Salem, Stark, Trumbull and Tuscarawas, as well as the Twinsburg Academic Center, is open to anyone with a high school diploma or its equivalent. For more information on admissions, contact the Regional Campuses admissions offices.

International Students: All international students must provide proof of proficiency of the English language (unless they meet specific exceptions) through the submission of an English language proficiency test score or by completing English language classes at Kent State's English as a Second Language Center before entering their program. For more information, visit the admissions website for international students.

Former Students: Former Kent State students who have not attended another institution since Kent State and were not academically dismissed will complete the re-enrollment process through the Financial, Billing and Enrollment Center. Former students who attended another college

or university since leaving Kent State must apply for admissions as a transfer or post-undergraduate student.

Transfer Students: Students who attended an educational institution after graduating from high school or earning their GED must apply as transfer students. For more information, visit the admissions website for transfer students.

Admission policies for undergraduate students may be found in the University Catalog's Academic Policies.

Students may be required to meet certain criteria to progress in their program. Any progression requirements will be listed on the program's Coursework tab

Program Requirements

Major Requirements

Code	Title	Credit Hours
Major Requirements (courses count in major GPA)		
CHEM 10060	GENERAL CHEMISTRY I (KBS)	4
CHEM 10062	GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
PHY 12000	INTRODUCTORY PHYSICS SEMINAR (ELR)	1
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB) ¹	5
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB) ¹	5
PHY 30020	INTERMEDIATE PHYSICS LABORATORY (WIC) ²	2
PHY 35101	CLASSICAL MECHANICS	4
PHY 36001	INTRODUCTORY MODERN PHYSICS	3
PHY 40020	ADVANCED PHYSICS LABORATORY (WIC) ²	2
PHY 40092	INTERNSHIP IN PHYSICS (ELR)	2
or PHY 40096	INDIVIDUAL INVESTIGATION (ELR)	
PHY 45201	ELECTROMAGNETIC THEORY	4
PHY 46101	QUANTUM MECHANICS	4
Mathematics Electives, choose from the following:		8-10
MATH 21001 & MATH 22005 & MATH 32044	LINEAR ALGEBRA and ANALYTIC GEOMETRY AND CALCULUS III and ORDINARY DIFFERENTIAL EQUATIONS	
MATH 32051 & MATH 32052	MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I and MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II	
Additional Requirements (courses do not count in major GPA)		
UC 10001	FLASHES 101	1
Foreign Language (see Foreign Language College Requirement below)		8
American Civic Literacy Requirement ³		3
Kent Core Composition		6
Kent Core Humanities and Fine Arts (minimum one course from each) ^{3,4}		6-9
Concentrations		
Choose from the following:		41
Biological Sciences		
Chemistry		
Computer Science		
Entrepreneurship		

Physics	
Pre-Medicine/Pre-Osteopathy/Pre-Podiatry	
Minimum Total Credit Hours:	120

- ¹ Credit is not granted for both the PHY 13001/PHY 13002 and the PHY 23101/PHY 23102 series, nor for PHY 13012.
- ² A minimum C grade must be earned to fulfill the writing-intensive requirement.
- ³ If students complete the American Civic Literacy requirement by taking HIST 12061, the course will apply to the Kent Core Humanities category. If they complete it with POL 10101, the course will apply to the Kent Core Social Sciences category or general electives.
- ⁴ PHIL 21001 is highly recommended to fulfill the Kent Core Humanities category for the Pre-Medicine/Pre-Osteopathy/Pre-Podiatry concentration.

Biological Sciences Concentration Requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
BSCI 10110	BIOLOGICAL DIVERSITY (ELR) (KBS) (KLAB)	4
BSCI 10120	BIOLOGICAL FOUNDATIONS (ELR) (KBS) (KLAB)	4
BSCI 30140	CELL BIOLOGY	4
BSCI 30156	ELEMENTS OF GENETICS	3
BSCI 40163	EVOLUTION	3
CHEM 10061	GENERAL CHEMISTRY II (KBS)	4
CHEM 10063	GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
Physics (PHY) Upper-Division Electives (30000 or 40000 level) ¹		6
Additional Requirements (courses do not count in major GPA)		
Kent Core Social Sciences (must be from two disciplines) ²		3-6
General Electives (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours) ¹		6
Minimum Total Credit Hours:		41

- ¹ A maximum 6 credit hours of PHY 40096 may be applied toward the major. Recommended electives: BSCI 40158, CHEM 30481, PHY 44600.
- ² If students complete the American Civic Literacy requirement by taking HIST 12061, the course will apply to the Kent Core Humanities category. If they complete it with POL 10101, the course will apply to the Kent Core Social Sciences category.

Chemistry Concentration Requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
CHEM 10061	GENERAL CHEMISTRY II (KBS)	4
CHEM 10063	GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
CHEM 30301	INORGANIC CHEMISTRY I	3
CHEM 30481	ORGANIC CHEMISTRY I ¹	4
CHEM 30482	ORGANIC CHEMISTRY II ¹	4
Chemistry (CHEM) Upper-Division Electives (30000 or 40000 level)		4
Physics (PHY) Upper-Division Electives (30000 or 40000 level) ²		12
Additional Requirements (courses do not count in major GPA)		
Kent Core Social Sciences (must be from two disciplines) ³		3-6

General Elective (total credit hours depends on earning 120 credit hours, including a minimum of 39 upper-division credit hours)	3
Minimum Total Credit Hours:	41

- ¹ Students who have already completed CHEM 30481 and CHEM 30482 may not take and apply CHEM 20482 toward the major.
- ² A maximum 6 credit hours of PHY 40096 may be applied toward the major.
- ³ If students complete the American Civic Literacy requirement by taking HIST 12061, the course will apply to the Kent Core Humanities category. If they complete it with POL 10101, the course will apply to the Kent Core Social Sciences category.

Computer Science Concentration Requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
CS 13001	COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING	4
or CS 13011 & CS 13012	COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING	
CS 23001	COMPUTER SCIENCE II: DATA STRUCTURES AND ABSTRACTION	4
CS 23022	DISCRETE STRUCTURES FOR COMPUTER SCIENCE	3
CS 42201	NUMERICAL LINEAR ALGEBRA	3
Computer Science (CS) or Mathematics (MATH) or Physics (PHY) Upper-Division Electives (30000 or 40000 level) ¹		6
Physics (PHY) Upper-Division Electives (30000 or 40000 level) ¹		8
Additional Requirements (courses do not count in major GPA)		
Kent Core Social Sciences (must be from two disciplines) ²		3-6
General Electives (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours)		7
Minimum Total Credit Hours:		41

- ¹ A maximum 6 credit hours of PHY 40096 may be applied toward the major.
- ² If students complete the American Civic Literacy requirement by taking HIST 12061, the course will apply to the Kent Core Humanities category. If they complete it with POL 10101, the course will apply to the Kent Core Social Sciences category.

Entrepreneurship Concentration Requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
ACCT 23020	INTRODUCTION TO FINANCIAL ACCOUNTING	3
or ENTR 37040	ENTREPRENEURIAL TOOLS	
ECON 22060	PRINCIPLES OF MICROECONOMICS (KSS)	3
ENTR 27056	INTRODUCTION TO ENTREPRENEURSHIP	3
ENTR 27466	SPEAKER SERIES IN ENTREPRENEURSHIP	1
ENTR 37065	FINANCING THE ENTREPRENEURIAL VENTURE	3
MKTG 25010	PRINCIPLES OF MARKETING	3
Mathematics (MATH) or Physics (PHY) Upper-Division Electives (30000 or 40000 level) ¹		6
Physics (PHY) Upper-Division Electives (30000 or 40000 level) ¹		6
Additional Requirements (courses do not count in major GPA)		
Kent Core Social Sciences (must be from two disciplines) ²		0-3

General Electives (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours)³ 10

Minimum Total Credit Hours: 41

¹ A maximum 6 credit hours of PHY 40096 may be applied toward the major.

² If students complete the American Civic Literacy requirement by taking HIST 12061, the course will apply to the Kent Core Humanities category. If they complete it with POL 10101, the course will apply to the Kent Core Social Sciences category.

³ Recommended electives: ENTR 47047 and one of the following: ENTR 37045, ENTR 37075, MKTG 35056.

Physics Concentration Requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
PHY 45301	THERMAL PHYSICS	3
Physics (PHY) Upper-Division Electives (30000 or 40000 level) ¹		15
Concentration Electives, choose from the following:		5-6
CHEM 10061 & CHEM 10063	GENERAL CHEMISTRY II (KBS) and GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	
Any Computer Science (CS) course (20000, 30000 or 40000 level)		
Any Mathematics (MATH) Upper-Division course (30000 or 40000 level)		
Any Physics (PHY) Upper-Division course (30000 or 40000 level) ¹		
Programming Elective, choose from the following:		3-4
CS 10062	PROGRAMMING FOR PROBLEM SOLVING IN SCIENCES	
CS 13001	COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING	
CS 13011 & CS 13012	COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING	
ENGR 15300 & ENGR 15301	ENGINEERING COMPUTING AND PROBLEM SOLVING and ENGINEERING COMPUTING AND PROBLEM SOLVING LABORATORY	
ENGR 26220 & ENGR 26222	PROGRAMMING FOR ENGINEERS and PROGRAMMING FOR ENGINEERS LABORATORY	
Additional Requirements (courses do not count in major GPA)		
Kent Core Social Sciences (must be from two disciplines) ²		3-6
General Electives (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours)		9
Minimum Total Credit Hours:		41

¹ A maximum 6 credit hours of PHY 40096 may be applied toward the major.

² If students complete the American Civic Literacy requirement by taking HIST 12061, the course will apply to the Kent Core Humanities category. If they complete it with POL 10101, the course will apply to the Kent Core Social Sciences category.

Pre-Medicine/Pre-Osteopathy/Pre-Podiatry Concentration Requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
BSCI 10120	BIOLOGICAL FOUNDATIONS (ELR) (KBS) (KLAB)	4
BSCI 30130	HUMAN PHYSIOLOGY	3
or BSCI 40430	ANIMAL PHYSIOLOGY	
BSCI 30140	CELL BIOLOGY	4
BSCI 30156	ELEMENTS OF GENETICS	3-4
or BSCI 30171	GENERAL MICROBIOLOGY	
CHEM 10061	GENERAL CHEMISTRY II (KBS)	4
CHEM 10063	GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
CHEM 30284	INTRODUCTORY BIOLOGICAL CHEMISTRY	4
or CHEM 40245	BIOCHEMICAL FOUNDATIONS OF MEDICINE	
CHEM 30475	ORGANIC CHEMISTRY LABORATORY I (ELR)	1
CHEM 30476	ORGANIC CHEMISTRY LABORATORY II	1
CHEM 30481	ORGANIC CHEMISTRY I	4
CHEM 30482	ORGANIC CHEMISTRY II	4
PSYC 11762	GENERAL PSYCHOLOGY (KSS)	3
SOC 12050	INTRODUCTION TO SOCIOLOGY (KSS)	3
Additional Requirements (courses do not count in major GPA)		
General Elective (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours) ¹		0-2
Minimum Total Credit Hours:		41

¹ If students complete the American Civic Literacy requirement by taking HIST 12061, the course will apply to the Kent Core Humanities category. If they complete it with POL 10101, the course will apply toward general electives.

Graduation Requirements

Minimum Major GPA	Minimum Overall GPA
2.000	2.000

- The following courses may not count toward major requirements: PHY 11030, PHY 21040, PHY 21041, PHY 21430 and PHY 21431.

Foreign Language College Requirement, B.S.

- Students pursuing the Bachelor of Science degree in the College of Sciences and Humanities must complete 8 credit hours of foreign language.¹
- [The following programs are exempt from this requirement: The Bachelor of Science in Cybercriminology and the Bachelor of Science in Medical Laboratory Science.](#)²
- Minimum Elementary I and II of the same language

¹ 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 start beyond the Elementary I level and will complete the requirement with fewer credit hours and courses. This may be accomplished by (1) passing a course beyond Elementary I through Intermediate II level; (2) receiving credit through one of the alternative credit programs offered by Kent State University; or (3) demonstrating language proficiency comparable to Elementary II of a foreign language. When students complete the requirement with fewer

than 8 credit hours and two courses, they will complete remaining credit hours with general electives.

² The Bachelor of Science in Medical Laboratory Science exemption exists under another college policy (Three-Plus-One Programs). The Bachelor of Science in Cybercriminology exemption is due to its extensive collaboration with and contribution from the Information Technology program in the College of Applied and Technical Studies, which does not have a foreign language requirement.

Roadmaps

Biological Sciences Concentration

This roadmap is a recommended semester-by-semester plan of study for this program. Students will work with their advisor to develop a sequence based on their academic goals and history. Courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

Semester One		Credits
!	CHEM 10060 GENERAL CHEMISTRY I (KBS)	4
!	CHEM 10062 GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
!	MATH 12002 ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
!	PHY 12000 INTRODUCTORY PHYSICS SEMINAR (ELR)	1
	UC 10001 FLASHES 101	1
	Kent Core Requirement	3
Credit Hours		15
Semester Two		Credits
!	CHEM 10061 GENERAL CHEMISTRY II (KBS)	4
!	CHEM 10063 GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
!	MATH 12003 ANALYTIC GEOMETRY AND CALCULUS II	5
!	PHY 23101 GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
Credit Hours		15
Semester Three		Credits
!	BSCI 10110 BIOLOGICAL DIVERSITY (ELR) (KBS) (KLAB)	4
!	PHY 23102 GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
!	Mathematics Elective	4
!	Mathematics Elective or Kent Core Requirement	3
Credit Hours		16
Semester Four		Credits
!	BSCI 10120 BIOLOGICAL FOUNDATIONS (ELR) (KBS) (KLAB)	4
!	Mathematics Elective	3-4
	Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3
	Kent Core Requirement	3
Credit Hours		14
Semester Five		Credits
!	BSCI 30156 ELEMENTS OF GENETICS	3
!	PHY 35101 CLASSICAL MECHANICS	4
!	PHY 36001 INTRODUCTORY MODERN PHYSICS	3
	Foreign Language	4
	Kent Core Requirement	0-3
Credit Hours		14
Semester Six		Credits
!	BSCI 30140 CELL BIOLOGY	4
!	PHY 30020 INTERMEDIATE PHYSICS LABORATORY (WIC)	2
	Foreign Language	4

	American Civic Literacy Requirement	3
	Kent Core Requirement	3
Credit Hours		16
Semester Seven		Credits
!	BSCI 40163 EVOLUTION	3
!	PHY 40092 INTERNSHIP IN PHYSICS (ELR) or PHY 40096 or INDIVIDUAL INVESTIGATION (ELR)	2
!	PHY 45201 ELECTROMAGNETIC THEORY	4
	Kent Core Requirement	3
	Kent Core Requirement	3
Credit Hours		15
Semester Eight		Credits
!	PHY 40020 ADVANCED PHYSICS LABORATORY (WIC)	2
	PHY 46101 QUANTUM MECHANICS	4
	Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3
	General Electives	6
Credit Hours		15
Minimum Total Credit Hours:		120

Chemistry Concentration

This roadmap is a recommended semester-by-semester plan of study for this program. Students will work with their advisor to develop a sequence based on their academic goals and history. Courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

Semester One		Credits
!	CHEM 10060 GENERAL CHEMISTRY I (KBS)	4
!	CHEM 10062 GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
!	MATH 12002 ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
!	PHY 12000 INTRODUCTORY PHYSICS SEMINAR (ELR)	1
	UC 10001 FLASHES 101	1
	Kent Core Requirement	3
Credit Hours		15
Semester Two		Credits
!	CHEM 10061 GENERAL CHEMISTRY II (KBS)	4
!	CHEM 10063 GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
!	MATH 12003 ANALYTIC GEOMETRY AND CALCULUS II	5
!	PHY 23101 GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
Credit Hours		15
Semester Three		Credits
	CHEM 30481 ORGANIC CHEMISTRY I	4
!	PHY 23102 GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
!	Mathematics Elective	4
!	Mathematics Elective or Kent Core Requirement	3
Credit Hours		16
Semester Four		Credits
	CHEM 30482 ORGANIC CHEMISTRY II	4
!	Mathematics Elective	3-4
	Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3
	Kent Core Requirement	3
Credit Hours		14
Semester Five		Credits
!	PHY 35101 CLASSICAL MECHANICS	4
!	PHY 36001 INTRODUCTORY MODERN PHYSICS	3

Foreign Language	4
American Civic Literacy Requirement	3
Kent Core Requirement	0-3
Credit Hours	14
Semester Six	
! CHEM 30301 INORGANIC CHEMISTRY I	3
! PHY 30020 INTERMEDIATE PHYSICS LABORATORY (WIC)	2
! PHY 46101 QUANTUM MECHANICS	4
Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3
Foreign Language	4
Credit Hours	16
Semester Seven	
! PHY 40092 INTERNSHIP IN PHYSICS (ELR) or PHY 40096 or INDIVIDUAL INVESTIGATION (ELR)	2
! PHY 45201 ELECTROMAGNETIC THEORY	4
Chemistry (CHEM) Upper-Division Electives (30000 or 40000 level)	4
Kent Core Requirement	3
Kent Core Requirement	3
Credit Hours	16
Semester Eight	
! PHY 40020 ADVANCED PHYSICS LABORATORY (WIC)	2
Physics (PHY) Upper-Division Electives (30000 or 40000 level)	6
Kent Core Requirement	3
General Elective	3
Credit Hours	14
Minimum Total Credit Hours:	120

Computer Science Concentration

This roadmap is a recommended semester-by-semester plan of study for this program. Students will work with their advisor to develop a sequence based on their academic goals and history. Courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

Semester One		Credits
! MATH 12002 ANALYTIC GEOMETRY AND CALCULUS I (KMCR)		5
! PHY 12000 INTRODUCTORY PHYSICS SEMINAR (ELR)		1
UC 10001 FLASHES 101		1
Kent Core Requirement		3
Kent Core Requirement		3
General Elective		3
Credit Hours		16
Semester Two		
CS 13001 COMPUTER SCIENCE I: PROGRAMMING AND or CS 13011 PROBLEM SOLVING and CS 13012 or COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING	4	
! MATH 12003 ANALYTIC GEOMETRY AND CALCULUS II	5	
! PHY 23101 GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5	
Credit Hours		14
Semester Three		
! CS 23022 DISCRETE STRUCTURES FOR COMPUTER SCIENCE	3	
! PHY 23102 GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5	
! Mathematics Elective	4	

! Mathematics Elective or Kent Core Requirement	3
Credit Hours	15
Semester Four	
Computer Science (CS) or Mathematics (MATH) or Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3
! Mathematics Elective	3-4
American Civic Literacy Requirement	3
Kent Core Requirement	3
Kent Core Requirement	0-3
Credit Hours	13
Semester Five	
! PHY 30020 INTERMEDIATE PHYSICS LABORATORY (WIC)	2
! PHY 35101 CLASSICAL MECHANICS	4
! PHY 36001 INTRODUCTORY MODERN PHYSICS	3
! PHY 45201 ELECTROMAGNETIC THEORY	4
Foreign Language	4
Credit Hours	17
Semester Six	
! CS 23001 COMPUTER SCIENCE II: DATA STRUCTURES AND ABSTRACTION	4
PHY 46101 QUANTUM MECHANICS	4
Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3
Foreign Language	4
Credit Hours	15
Semester Seven	
! CHEM 10060 GENERAL CHEMISTRY I (KBS)	4
! CHEM 10062 GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
! CS 42201 NUMERICAL LINEAR ALGEBRA	3
! PHY 40020 ADVANCED PHYSICS LABORATORY (WIC)	2
! PHY 40092 INTERNSHIP IN PHYSICS (ELR) or PHY 40096 or INDIVIDUAL INVESTIGATION (ELR)	2
Kent Core Requirement	3
Credit Hours	15
Semester Eight	
Computer Science (CS) or Mathematics (MATH) or Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3
Physics (PHY) Upper-Division Electives (30000 or 40000 level)	5
Kent Core Requirement	3
General Electives	4
Credit Hours	15
Minimum Total Credit Hours:	120

Entrepreneurship Concentration

This roadmap is a recommended semester-by-semester plan of study for this program. Students will work with their advisor to develop a sequence based on their academic goals and history. Courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

Semester One		Credits
! CHEM 10060 GENERAL CHEMISTRY I (KBS)		4
! CHEM 10062 GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)		1
! MATH 12002 ANALYTIC GEOMETRY AND CALCULUS I (KMCR)		5
! PHY 12000 INTRODUCTORY PHYSICS SEMINAR (ELR)		1
UC 10001 FLASHES 101		1

Kent Core Requirement	3
Credit Hours	15
Semester Two	
! MATH 12003 ANALYTIC GEOMETRY AND CALCULUS II	5
! PHY 23101 GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
American Civic Literacy Requirement	3
Kent Core Requirement	3
Credit Hours	16
Semester Three	
! ECON 22060 PRINCIPLES OF MICROECONOMICS (KSS)	3
! ENTR 27056 INTRODUCTION TO ENTREPRENEURSHIP	3
! PHY 23102 GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
! Mathematics Elective	4
! Mathematics Elective or Kent Core Requirement	3
Credit Hours	18
Semester Four	
! Mathematics Elective	3-4
Mathematics (MATH) or Physics (PHY) Upper-Division Electives (30000 or 40000 level)	6
General Electives	6
Credit Hours	16
Semester Five	
ACCT 23020 INTRODUCTION TO FINANCIAL ACCOUNTING or ENTR 37040 or ENTREPRENEURIAL TOOLS	3
! PHY 35101 CLASSICAL MECHANICS	4
! PHY 36001 INTRODUCTORY MODERN PHYSICS	3
Foreign Language	4
Kent Core Requirement	0-3
Credit Hours	14
Semester Six	
ENTR 27466 SPEAKER SERIES IN ENTREPRENEURSHIP	1
ENTR 37065 FINANCING THE ENTREPRENEURIAL VENTURE	3
MKTG 25010 PRINCIPLES OF MARKETING	3
! PHY 30020 INTERMEDIATE PHYSICS LABORATORY (WIC)	2
Foreign Language	4
Credit Hours	13
Semester Seven	
! PHY 40092 INTERNSHIP IN PHYSICS (ELR) or PHY 40096 or INDIVIDUAL INVESTIGATION (ELR)	2
! PHY 45201 ELECTROMAGNETIC THEORY	4
Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3
Kent Core Requirement	3
Kent Core Requirement	3
Credit Hours	15
Semester Eight	
! PHY 40020 ADVANCED PHYSICS LABORATORY (WIC)	2
! PHY 46101 QUANTUM MECHANICS	4
Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3
General Electives	4
Credit Hours	13
Minimum Total Credit Hours:	120

Physics Concentration

This roadmap is a recommended semester-by-semester plan of study for this program. Students will work with their advisor to develop a sequence

based on their academic goals and history. Courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

Semester One		Credits
! MATH 12002 ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5	
PHY 12000 INTRODUCTORY PHYSICS SEMINAR (ELR)	1	
! PHY 23101 GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5	
UC 10001 FLASHES 101	1	
Kent Core Requirement	3	
Credit Hours	15	
Semester Two		
! MATH 12003 ANALYTIC GEOMETRY AND CALCULUS II	5	
! PHY 23102 GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5	
American Civic Literacy Requirement	3	
Kent Core Requirement	3	
Credit Hours	16	
Semester Three		
! CHEM 10060 GENERAL CHEMISTRY I (KBS)	4	
! CHEM 10062 GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1	
! PHY 36001 INTRODUCTORY MODERN PHYSICS	3	
! Mathematics Elective	4	
! Mathematics Elective or Kent Core Requirement	3	
Credit Hours	15	
Semester Four		
! PHY 45301 THERMAL PHYSICS	3	
Concentration Electives	5-6	
! Mathematics Elective	3-4	
Kent Core Requirement	0-3	
Credit Hours	12	
Semester Five		
! PHY 35101 CLASSICAL MECHANICS	4	
! PHY 40092 INTERNSHIP IN PHYSICS (ELR) or PHY 40096 or INDIVIDUAL INVESTIGATION (ELR)	2	
Physics (PHY) Upper-Division Elective (30000 or 40000 level)	3	
Programming Elective	3-4	
Foreign Language	4	
Credit Hours	16	
Semester Six		
! PHY 30020 INTERMEDIATE PHYSICS LABORATORY (WIC)	2	
! PHY 46101 QUANTUM MECHANICS	4	
Physics (PHY) Upper-Division Electives (30000 or 40000 level)	6	
Foreign Language	4	
Credit Hours	16	
Semester Seven		
! 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	
Semester Eight		
Physics (PHY) Upper-Division Electives (30000 or 40000 level)	6	
Kent Core Requirement	3	

General Electives	6
Credit Hours	15
Minimum Total Credit Hours:	120

Pre-Medicine/Pre-Osteopathy/Pre-Podiatry Concentration

This roadmap is a recommended semester-by-semester plan of study for this program. Students will work with their advisor to develop a sequence based on their academic goals and history. Courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

Semester One		Credits
!	CHEM 10060 GENERAL CHEMISTRY I (KBS)	4
!	CHEM 10062 GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
!	MATH 12002 ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
!	PHY 12000 INTRODUCTORY PHYSICS SEMINAR (ELR)	1
!	PHY 23101 GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
	UC 10001 FLASHES 101	1
Credit Hours		17
Semester Two		
!	CHEM 10061 GENERAL CHEMISTRY II (KBS)	4
!	CHEM 10063 GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
!	MATH 12003 ANALYTIC GEOMETRY AND CALCULUS II	5
!	PHY 23102 GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
Credit Hours		15
Semester Three		
!	BSCI 10120 BIOLOGICAL FOUNDATIONS (ELR) (KBS) (KLAB)	4
!	CHEM 30475 ORGANIC CHEMISTRY LABORATORY I (ELR)	1
!	CHEM 30481 ORGANIC CHEMISTRY I	4
!	Mathematics Elective	4
!	Mathematics Elective or Kent Core Requirement	3
Credit Hours		16
Semester Four		
!	BSCI 30140 CELL BIOLOGY	4
!	CHEM 30476 ORGANIC CHEMISTRY LABORATORY II	1
!	CHEM 30482 ORGANIC CHEMISTRY II	4
	PSYC 11762 GENERAL PSYCHOLOGY (KSS)	3
!	Mathematics Elective	3-4
Credit Hours		16
Semester Five		
!	BSCI 30130 HUMAN PHYSIOLOGY or BSCI 40430 or ANIMAL PHYSIOLOGY	3
!	PHY 35101 CLASSICAL MECHANICS	4
!	PHY 36001 INTRODUCTORY MODERN PHYSICS	3
	SOC 12050 INTRODUCTION TO SOCIOLOGY (KSS)	3
	Kent Core Requirement	3
Credit Hours		16
Semester Six		
!	BSCI 30156 ELEMENTS OF GENETICS or BSCI 30171 or GENERAL MICROBIOLOGY	3-4
!	CHEM 30284 INTRODUCTORY BIOLOGICAL CHEMISTRY or CHEM 40245 or BIOCHEMICAL FOUNDATIONS OF MEDICINE	4

!	PHY 30020 INTERMEDIATE PHYSICS LABORATORY (WIC)	2
!	PHY 46101 QUANTUM MECHANICS	4
	Kent Core Requirement	0-3
Credit Hours		13
Semester Seven		
!	PHY 40092 INTERNSHIP IN PHYSICS (ELR) or PHY 40096 or INDIVIDUAL INVESTIGATION (ELR)	2
!	PHY 45201 ELECTROMAGNETIC THEORY	4
	Foreign Language	4
	American Civic Literacy Requirement	3
	Kent Core Requirement or General Elective	2-3
Credit Hours		15
Semester Eight		
!	PHY 40020 ADVANCED PHYSICS LABORATORY (WIC)	2
	Foreign Language	4
	Kent Core Requirement	3
	Kent Core Requirement	3
Credit Hours		12
Minimum Total Credit Hours:		120

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.

Flashes 101 (UC 10001)	1 credit hour
Course is not required for students with 30+ transfer credits (excluding College Credit Plus) or age 21+ at time of admission.	
American Civic Literacy	3 credit hours
Experiential Learning Requirement (ELR)	varies
Students must successfully complete one course or approved experience.	
Kent Core (see table below)	36-37 credit hours
Writing-Intensive Course (WIC)	1 course
Students must earn a minimum C grade in the course.	
Upper-Division Requirement	39 credit hours
Students must successfully complete 39 upper-division (numbered 30000 to 49999) credit hours to graduate.	
Total Credit Hour Requirement	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
Total Credit Hours:	36-37

Program Learning Outcomes

Graduates of this program will be able to:

1. Demonstrate strong technical and cognitive skills expected of a competent physicist, including the ability to:
 - a. Think critically and analytically.
 - b. Identify, define and solve complex scientific problems.
 - c. Apply advanced mathematical methods (such as calculus and differential equations) and computational tools.
 - d. Use, design and construct laboratory equipment and instrumentation.
2. Exhibit key personal and professional traits of successful scientists, including diligence, creativity, persistence and self-confidence.
3. Communicate scientific findings effectively to peers, supervisors and professional audiences within the physics community and general public.

Program Policies

Foreign Language Requirements

In general, students may elect any foreign language taught through the Department of Modern and Classical Language Studies. However, certain majors, concentrations and minors require specific languages or limit the languages from which students may choose. In addition, students who plan to pursue graduate study may need particular languages for that study. In such cases, students should seek the advice of the appropriate department before selecting a language.

Progress Toward Fulfillment

College of Sciences and Humanities students are encouraged to begin meeting the foreign language requirement as early as possible in their program to ensure timely degree completion.

Mandatory Outcomes Assessment

In addition to the other General Requirements of the college, candidates for an undergraduate degree in the College of Sciences and Humanities are required, as a condition of graduation, to participate in an outcomes assessment. These outcomes assessments are conducted by each undergraduate degree program in the College of Sciences and Humanities.

Full Description

The Bachelor of Science degree in Physics is a professionally oriented program that serves as preparation for either graduate work in physics or entrance into positions in a variety of industries or government service.

The Physics major comprises the following concentrations:

- The **Biological Sciences** concentration is interdisciplinary and for students with a strong interest in both physics and biology, who may wish to prepare for graduate study in biophysics or work in a biotechnology company.
- The **Chemistry** concentration is interdisciplinary and designed for students with a strong interest in both physics and chemistry, who may wish to prepare for graduate study in chemical physics or work in a high-technology materials-related research and development laboratory.

- The **Computer Science** concentration is interdisciplinary and provides a foundation in physics while emphasizing the use of computer software in scientific applications. Graduates are prepared for computer-related careers that require an understanding of the underlying science as well as knowledge of relevant computer applications.
- The **Entrepreneurship** concentration is interdisciplinary and designed to prepare physics majors for various aspects of starting or managing a scientific business.
- The **Physics** concentration prepares students for further study at the graduate level or entry into industry careers. This concentration trains students in logical thinking and problem solving using both analytical and computational methods. It also furnishes students with a comprehensive understanding of the basic laws and principles that govern the physical world. In addition, this concentration prepares students for applications of physics to practical devices and systems, making it a popular stepping stone to graduate degrees and careers not only in physics, but also engineering, astronomy/astrophysics, materials science and applied mathematics.
- The **Pre-Medicine/Pre-Osteopathy/Pre-Podiatry** concentration is interdisciplinary and designed to prepare physics majors for further study leading to careers in medicine.