# PHYSICS - B.S.

**College of Arts and Sciences**
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

- Program Coordinator: **Hamza Balci** | hbalci@kent.edu | 330-672-2577
- 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 who graduated from high school three or more years ago.

**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 English language proficiency unless they meet specific exceptions. For more information, visit the admissions website for international students.

**Transfer Students:** Students who have attended any other educational institution after graduating from high school must apply as undergraduate transfer students. For more information, visit the admissions website for transfer students.

**Former Students:** Former Kent State students or graduates who have not attended another college or university since Kent State may complete the reenrollment or reinstatement form on the University Registrar's website.

Admission policies for undergraduate students may be found in the University Catalog.

Some programs may require that students meet certain requirements before progressing through the program. For programs with progression requirements, the information is shown on the 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 10061 | GENERAL CHEMISTRY II (KBS) | 4 |
| CHEM 10062 | GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB) | 1 |
| CHEM 10063 | GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB) | 1 |
| 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) [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 |
| **Additional Requirements (courses do not count in major GPA)** | | |
| UC 10001 | FLASHES 101 | 1 |
| Foreign Language (see Foreign Language College Requirement below) | | 8 |
| Kent Core Composition | | 6 |
| Kent Core Humanities and Fine Arts (minimum one course from each) [3] | | 9 |
| General Elective (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours) | | 1 |
| **Concentrations** | | |
| Choose from the following: | | 39 |
| Applied Physics | | |
| Biological Sciences | | |
| Chemistry | | |
| Computer Science | | |
| Entrepreneurship | | |
| Mathematical Physics | | |
| Pre-Medicine/Pre-Osteopathy/Pre-Podiatry | | |
| Research | | |
| **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] PHIL 21001 is highly recommended to fulfill the Kent Core Humanities category for the Pre-Medicine/Pre-Osteopathy/Pre-Podiatry concentration. This course also fulfills the global diversity requirement.

## Applied Physics 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 | |
| PHY 22564 | INTRODUCTION TO MATERIALS PHYSICS | 3 |
| PHY 32511 | ELECTRONICS | 4 |
| PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| PHY 45403 | DATA ANALYSIS AND COMPUTATIONAL PHYSICS TECHNIQUES | 3 |
| PHY 45501 | ELECTROMAGNETIC WAVES AND MODERN OPTICS | 3 |
| Physics (PHY) Elective [1] | | 3 |
| Physics (PHY) Upper-Division Elective (30000 or 40000 level) [1] | | 3 |
| **Additional Requirements (courses do not count in major GPA)** | | |
| Kent Core Social Sciences (must be from two disciplines) | | 6 |
| General Electives | | 7 |
| **Minimum Total Credit Hours:** | | **39** |

[1] Maximum 6 credit hours of PHY 40096 may be applied toward the major.

## 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 |
| PHY 45301 | THERMAL PHYSICS | 3 |
| PHY 46101 | QUANTUM MECHANICS | 4 |
| Major Upper-Division Elective [1] | | 3 |
| **Additional Requirements (courses do not count in major GPA)** | | |
| Kent Core Social Sciences (must be from two disciplines) | | 6 |
| General Electives | | 5 |
| **Minimum Total Credit Hours:** | | **39** |

[1] Recommended major electives: BSCI 40158, CHEM 30481, PHY 41010, PHY 44600.

## Chemistry Concentration Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Concentration Requirements (courses count in major GPA)** | | |
| CHEM 30481 | ORGANIC CHEMISTRY I [1] | 3 |
| CHEM 30482 | ORGANIC CHEMISTRY II [1] | 3 |
| CHEM 30105 | ANALYTICAL CHEMISTRY I | 3 |
| CHEM 30107 | ANALYTICAL CHEMISTRY LABORATORY I (WIC) [2] | 1 |
| CHEM 30301 | INORGANIC CHEMISTRY I | 3 |
| PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| PHY 45301 | THERMAL PHYSICS | 3 |
| PHY 46101 | QUANTUM MECHANICS | 4 |
| Physics (PHY) Electives [3] | | 6 |
| **Additional Requirements (courses do not count in major GPA)** | | |
| Kent Core Social Sciences (must be from two disciplines) | | 6 |
| General Electives | | 4 |
| **Minimum Total Credit Hours:** | | **39** |

[1] Students who have already completed CHEM 30481 and CHEM 30482 may not take and apply CHEM 20482 toward the program.

[2] A minimum C grade must be earned to fulfill the writing-intensive requirement.

[3] Maximum 6 credit hours of PHY 40096 may be applied toward the major.

## 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 COMPUTING I | 3 |
| PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| PHY 46101 | QUANTUM MECHANICS | 4 |
| 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) | | 6 |
| General Electives | | 6 |
| **Minimum Total Credit Hours:** | | **39** |

[1] Maximum 6 credit hours of PHY 40096 may be applied toward the major.

## 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 | ENTREPRENEURIAL FINANCE | 3 |
| MKTG 25010 | PRINCIPLES OF MARKETING | 3 |
| Physics (PHY) Upper-Division Electives (30000 or 40000 level) [1] | | 9 |

| | |
|---|---|
| **Additional Requirements (courses do not count in major GPA)** | |
| Kent Core Social Sciences (must be from two disciplines) | 3 |
| General Electives [2] | 11 |
| **Minimum Total Credit Hours:** | **39** |

[1] Maximum 6 credit hours of PHY 40096 may be applied toward the major.

[2] Recommended general electives: ENTR 47047 and one of the following: ENTR 37045, ENTR 37075, MKTG 35056.

## Mathematical Physics 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 | |
| PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| PHY 45401 | MATHEMATICAL METHODS IN PHYSICS | 4 |
| PHY 45403 | DATA ANALYSIS AND COMPUTATIONAL PHYSICS TECHNIQUES | 3 |
| PHY 46101 | QUANTUM MECHANICS | 4 |
| Physics (PHY) Electives [1] | | 9 |
| **Additional Requirements (courses do not count in major GPA)** | | |
| Kent Core Social Sciences (must be from two disciplines) | | 6 |
| General Electives | | 6 |
| **Minimum Total Credit Hours:** | | **39** |

[1] Maximum 6 credit hours of PHY 40096 may be applied toward the major.

## 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 |
| BSCI 30171 | GENERAL MICROBIOLOGY | 4 |
| 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 | 3 |
| CHEM 30482 | ORGANIC CHEMISTRY II | 3 |
| PSYC 11762 | GENERAL PSYCHOLOGY (DIVD) (KSS) | 3 |
| SOC 12050 | INTRODUCTION TO SOCIOLOGY (DIVD) (KSS) | 3 |
| Concentration Elective, choose from the following: | | 3-4 |
| BSCI 30518 | VERTEBRATE ANATOMY | |
| BSCI 40174 | IMMUNOLOGY | |
| BSCI 40517 | MEDICAL HISTOLOGY | |
| PHY 41010 | BIOPHOTONICS | |
| PHY 44600 | INTRODUCTION TO BIOLOGICAL PHYSICS | |
| **Minimum Total Credit Hours:** | | **39** |

## Research 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 | |
| PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| PHY 45301 | THERMAL PHYSICS | 3 |
| PHY 45403 | DATA ANALYSIS AND COMPUTATIONAL PHYSICS TECHNIQUES | 3 |
| PHY 46101 | QUANTUM MECHANICS | 4 |
| Physics (PHY) Electives [1] | | 5 |
| Physics (PHY) Upper-Division Electives (30000 or 40000 level) [1] | | 4 |
| **Additional Requirements (courses do not count in major GPA)** | | |
| Kent Core Social Sciences (must be from two disciplines) | | 6 |
| General Electives | | 7 |
| **Minimum Total Credit Hours:** | | **39** |

[1] Maximum 6 credit hours of PHY 40096 may be applied toward the major.

# Graduation Requirements

| Minimum Major GPA | Minimum Overall GPA |
|---|---|
| 2.000 | 2.000 |

- The following courses may not count towards the Physics 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 Arts and Sciences must complete 8 credit hours of foreign language.[1]
- The Bachelor of Science in Medical Laboratory Science is exempt from this requirement.[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 fewer 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).

# Roadmaps

## Applied Physics Concentration

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.

| | | | |
|---|---|---|---|
| | **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 |
| | Kent Core 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 |
| ! | MATH 32051 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I | 4 |
| | Foreign Language | | 4 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Four** | | |
| ! | CHEM 10061 | GENERAL CHEMISTRY II (KBS) | 4 |
| ! | CHEM 10063 | GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB) | 1 |
| ! | MATH 32052 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II | 4 |
| ! | PHY 36001 | INTRODUCTORY MODERN PHYSICS | 3 |
| | Foreign Language | | 4 |
| | | **Credit Hours** | **16** |
| | **Semester Five** | | |
| | CS 13001<br>or CS 13011<br>***and***<br>CS 13012 | COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING<br>or COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING ***and*** COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING | 4 |
| ! | PHY 35101 | CLASSICAL MECHANICS | 4 |
| ! | PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| ! | PHY 45201 | ELECTROMAGNETIC THEORY | 4 |
| | | **Credit Hours** | **15** |
| | **Semester Six** | | |
| ! | PHY 22564 | INTRODUCTION TO MATERIALS PHYSICS | 3 |
| ! | PHY 30020 | INTERMEDIATE PHYSICS LABORATORY (WIC) | 2 |
| ! | PHY 45403 | DATA ANALYSIS AND COMPUTATIONAL PHYSICS TECHNIQUES | 3 |
| | Physics (PHY) Elective | | 3 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **14** |
| | **Semester Seven** | | |
| ! | PHY 32511 | ELECTRONICS | 4 |
| ! | PHY 40092<br>or<br>PHY 40096 | INTERNSHIP IN PHYSICS (ELR)<br>or INDIVIDUAL INVESTIGATION (ELR) | 2 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | General Elective | | 3 |
| | | **Credit Hours** | **15** |
| | **Semester Eight** | | |
| ! | PHY 40020 | ADVANCED PHYSICS LABORATORY (WIC) | 2 |
| ! | PHY 45501 | ELECTROMAGNETIC WAVES AND MODERN OPTICS | 3 |
| | Physics (PHY) Upper-Division Elective (30000 or 40000 level) | | 3 |
| | General Electives | | 5 |
| | | **Credit Hours** | **13** |
| | | **Minimum Total Credit Hours:** | **120** |

## Biological Sciences Concentration

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.

| | | | |
|---|---|---|---|
| | **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** | | |
| ! | 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** | | |
| ! | BSCI 10110 | BIOLOGICAL DIVERSITY (ELR) (KBS) (KLAB) | 4 |
| ! | MATH 32051 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I | 4 |
| ! | PHY 23102 | GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB) | 5 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Four** | | |
| ! | BSCI 10120 | BIOLOGICAL FOUNDATIONS (ELR) (KBS) (KLAB) | 4 |
| ! | MATH 32052 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II | 4 |
| ! | PHY 36001 | INTRODUCTORY MODERN PHYSICS | 3 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **14** |
| | **Semester Five** | | |
| ! | BSCI 30156 | ELEMENTS OF GENETICS | 3 |
| ! | PHY 35101 | CLASSICAL MECHANICS | 4 |
| | Major Elective | | 3 |
| | Foreign Language | | 4 |
| | | **Credit Hours** | **14** |

| | | | |
|---|---|---|---|
| | **Semester Six** | | |
| ! | BSCI 30140 | CELL BIOLOGY | 4 |
| ! | PHY 30020 | INTERMEDIATE PHYSICS LABORATORY (WIC) | 2 |
| | Foreign Language | | 4 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Seven** | | |
| ! | BSCI 40163 | EVOLUTION | 3 |
| ! | PHY 40092<br>or<br>PHY 40096 | INTERNSHIP IN PHYSICS (ELR)<br>or INDIVIDUAL INVESTIGATION (ELR) | 2 |
| ! | PHY 45201 | ELECTROMAGNETIC THEORY | 4 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **15** |
| | **Semester Eight** | | |
| ! | PHY 40020 | ADVANCED PHYSICS LABORATORY (WIC) | 2 |
| ! | PHY 45301 | THERMAL PHYSICS | 3 |
| | PHY 46101 | QUANTUM MECHANICS | 4 |
| | 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 major. However, 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** | | |
| ! | 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** | | |
| | CHEM 30481 | ORGANIC CHEMISTRY I | 3 |
| ! | MATH 32051 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I | 4 |
| ! | PHY 23102 | GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB) | 5 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **15** |
| | **Semester Four** | | |
| | CHEM 30482 | ORGANIC CHEMISTRY II | 3 |
| ! | MATH 32052 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II | 4 |
| ! | PHY 36001 | INTRODUCTORY MODERN PHYSICS | 3 |
| | Kent Core Requirement | | 3 |
| | General Elective | | 2 |
| | | **Credit Hours** | **15** |
| | **Semester Five** | | |
| ! | PHY 35101 | CLASSICAL MECHANICS | 4 |
| ! | PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| | Foreign Language | | 4 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **14** |
| | **Semester Six** | | |
| ! | CHEM 30301 | INORGANIC CHEMISTRY I | 3 |
| ! | PHY 30020 | INTERMEDIATE PHYSICS LABORATORY (WIC) | 2 |
| ! | PHY 45301 | THERMAL PHYSICS | 3 |
| | PHY 46101 | QUANTUM MECHANICS | 4 |
| | Foreign Language | | 4 |
| | | **Credit Hours** | **16** |
| | **Semester Seven** | | |
| ! | CHEM 30105 | ANALYTICAL CHEMISTRY I | 3 |
| ! | CHEM 30107 | ANALYTICAL CHEMISTRY LABORATORY I (WIC) | 1 |
| ! | PHY 40092<br>or<br>PHY 40096 | INTERNSHIP IN PHYSICS (ELR)<br>or INDIVIDUAL INVESTIGATION (ELR) | 2 |
| ! | PHY 45201 | ELECTROMAGNETIC THEORY | 4 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Eight** | | |
| ! | PHY 40020 | ADVANCED PHYSICS LABORATORY (WIC) | 2 |
| | Physics (PHY) Electives | | 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 major. However, 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<br>or CS 13011<br>***and***<br>CS 13012 | COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING<br>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 |

| | | | |
|---|---|---|---|
| ! | MATH 32051 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I | 4 |
| ! | PHY 23102 | GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB) | 5 |
| | Foreign Language | | 4 |
| | | **Credit Hours** | **16** |
| | **Semester Four** | | |
| ! | MATH 32052 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II | 4 |
| ! | PHY 36001 | INTRODUCTORY MODERN PHYSICS | 3 |
| | Foreign Language | | 4 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **14** |
| | **Semester Five** | | |
| ! | PHY 30020 | INTERMEDIATE PHYSICS LABORATORY (WIC) | 2 |
| ! | PHY 35101 | CLASSICAL MECHANICS | 4 |
| ! | PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| ! | PHY 45201 | ELECTROMAGNETIC THEORY | 4 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **16** |
| | **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 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **14** |
| | **Semester Seven** | | |
| ! | CHEM 10060 | GENERAL CHEMISTRY I (KBS) | 4 |
| ! | CHEM 10062 | GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB) | 1 |
| ! | CS 42201 | NUMERICAL COMPUTING I | 3 |
| ! | PHY 40020 | ADVANCED PHYSICS LABORATORY (WIC) | 2 |
| ! | PHY 40092<br>or<br>PHY 40096 | INTERNSHIP IN PHYSICS (ELR)<br>or INDIVIDUAL INVESTIGATION (ELR) | 2 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **15** |
| | **Semester Eight** | | |
| ! | CHEM 10061 | GENERAL CHEMISTRY II (KBS) | 4 |
| ! | CHEM 10063 | GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB) | 1 |
| | Physics (PHY) Upper-Division Elective (30000 or 40000 level) | | 3 |
| | 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 major. However, 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** | | |
| ! | 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** | | |
| ! | ECON 22060 | PRINCIPLES OF MICROECONOMICS (KSS) | 3 |
| ! | ENTR 27056 | INTRODUCTION TO ENTREPRENEURSHIP | 3 |
| ! | MATH 32051 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I | 4 |
| ! | PHY 23102 | GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB) | 5 |
| | | **Credit Hours** | **15** |
| | **Semester Four** | | |
| ! | MATH 32052 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II | 4 |
| ! | PHY 36001 | INTRODUCTORY MODERN PHYSICS | 3 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | General Elective | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Five** | | |
| | ACCT 23020<br>or<br>ENTR 37040 | INTRODUCTION TO FINANCIAL ACCOUNTING<br>or ENTREPRENEURIAL TOOLS | 3 |
| ! | PHY 35101 | CLASSICAL MECHANICS | 4 |
| | PHY 45201 | ELECTROMAGNETIC THEORY | 4 |
| | Foreign Language | | 4 |
| | | **Credit Hours** | **15** |
| | **Semester Six** | | |
| | ENTR 27466 | SPEAKER SERIES IN ENTREPRENEURSHIP | 1 |
| | ENTR 37065 | ENTREPRENEURIAL FINANCE | 3 |
| | MKTG 25010 | PRINCIPLES OF MARKETING | 3 |
| ! | PHY 30020 | INTERMEDIATE PHYSICS LABORATORY (WIC) | 2 |
| | Foreign Language | | 4 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Seven** | | |
| ! | PHY 40092<br>or<br>PHY 40096 | INTERNSHIP IN PHYSICS (ELR)<br>or INDIVIDUAL INVESTIGATION (ELR) | 2 |
| | Physics (PHY) Upper-Division Elective (30000 or 40000 level) | | 3 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | General Elective | | 3 |
| | | **Credit Hours** | **14** |
| | **Semester Eight** | | |
| ! | PHY 40020 | ADVANCED PHYSICS LABORATORY (WIC) | 2 |
| | Physics (PHY) Upper-Division Electives (30000 or 40000 level) | | 6 |
| | General Electives | | 6 |
| | | **Credit Hours** | **14** |
| | | **Minimum Total Credit Hours:** | **120** |

## Mathematical Physics Concentration

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.

| | 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** | | |
| ! | 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** | | |
| | CS 13001<br>or CS 13011<br>***and***<br>CS 13012 | COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING<br>or COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING ***and*** COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING | 4 |
| ! | MATH 32051 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I | 4 |
| ! | PHY 23102 | GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB) | 5 |
| | General Elective | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Four** | | |
| ! | MATH 32052 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II | 4 |
| ! | PHY 36001 | INTRODUCTORY MODERN PHYSICS | 3 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | General Elective | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Five** | | |
| ! | PHY 35101 | CLASSICAL MECHANICS | 4 |
| ! | PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| ! | PHY 45201 | ELECTROMAGNETIC THEORY | 4 |
| | Foreign Language | | 4 |
| | | **Credit Hours** | **15** |
| | **Semester Six** | | |
| ! | PHY 30020 | INTERMEDIATE PHYSICS LABORATORY (WIC) | 2 |
| ! | PHY 45403 | DATA ANALYSIS AND COMPUTATIONAL PHYSICS TECHNIQUES | 3 |
| | PHY 46101 | QUANTUM MECHANICS | 4 |
| | Foreign Language | | 4 |
| | | **Credit Hours** | **13** |
| | **Semester Seven** | | |
| ! | PHY 40092<br>or<br>PHY 40096 | INTERNSHIP IN PHYSICS (ELR)<br>or INDIVIDUAL INVESTIGATION (ELR) | 2 |
| ! | PHY 45401 | MATHEMATICAL METHODS IN PHYSICS | 4 |
| | Physics (PHY) Elective | | 3 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **15** |
| | **Semester Eight** | | |
| ! | PHY 40020 | ADVANCED PHYSICS LABORATORY (WIC) | 2 |
| | Physics (PHY) Electives | | 6 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | General Elective | | 1 |
| | | **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 major. However, 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 | 3 |
| ! | MATH 32051 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I | 4 |
| | PSYC 11762 | GENERAL PSYCHOLOGY (DIVD) (KSS) | 3 |
| | | **Credit Hours** | **15** |
| | **Semester Four** | | |
| ! | BSCI 30140 | CELL BIOLOGY | 4 |
| ! | CHEM 30476 | ORGANIC CHEMISTRY LABORATORY II | 1 |
| ! | CHEM 30482 | ORGANIC CHEMISTRY II | 3 |
| ! | MATH 32052 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II | 4 |
| ! | PHY 36001 | INTRODUCTORY MODERN PHYSICS | 3 |
| | | **Credit Hours** | **15** |
| | **Semester Five** | | |
| ! | BSCI 30130<br>or<br>BSCI 40430 | HUMAN PHYSIOLOGY<br>or ANIMAL PHYSIOLOGY | 3 |
| ! | BSCI 30156 | ELEMENTS OF GENETICS | 3 |
| ! | PHY 35101 | CLASSICAL MECHANICS | 4 |
| | SOC 12050 | INTRODUCTION TO SOCIOLOGY (DIVD) (KSS) | 3 |

| | | | |
|---|---|---|---|
| | Concentration Elective or Kent Core Requirement | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Six** | | |
| ! | BSCI 30171 | GENERAL MICROBIOLOGY | 4 |
| ! | CHEM 30284 or CHEM 40245 | INTRODUCTORY BIOLOGICAL CHEMISTRY or BIOCHEMICAL FOUNDATIONS OF MEDICINE | 4 |
| ! | PHY 30020 | INTERMEDIATE PHYSICS LABORATORY (WIC) | 2 |
| | Concentration Elective or Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Seven** | | |
| ! | PHY 40092 or PHY 40096 | INTERNSHIP IN PHYSICS (ELR) or INDIVIDUAL INVESTIGATION (ELR) | 2 |
| ! | PHY 45201 | ELECTROMAGNETIC THEORY | 4 |
| | Foreign Language | | 4 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **13** |
| | **Semester Eight** | | |
| ! | PHY 40020 | ADVANCED PHYSICS LABORATORY (WIC) | 2 |
| | Foreign Language | | 4 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | General Elective | | 1 |
| | | **Credit Hours** | **13** |
| | | **Minimum Total Credit Hours:** | **120** |

## Research Concentration

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.

| | **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 |
| | Kent Core 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 |
| ! | MATH 32051 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I | 4 |
| | Foreign Language | | 4 |
| | Kent Core Requirement | | 3 |
| | | **Credit Hours** | **16** |
| | **Semester Four** | | |
| ! | CHEM 10061 | GENERAL CHEMISTRY II (KBS) | 4 |
| ! | CHEM 10063 | GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB) | 1 |
| ! | MATH 32052 | MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II | 4 |
| ! | PHY 36001 | INTRODUCTORY MODERN PHYSICS | 3 |
| | Foreign Language | | 4 |
| | | **Credit Hours** | **16** |
| | **Semester Five** | | |
| | CS 13001 or CS 13011 ***and*** CS 13012 | COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING or COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING ***and*** COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING | 4 |
| ! | PHY 35101 | CLASSICAL MECHANICS | 4 |
| ! | PHY 36002 | APPLICATIONS OF MODERN PHYSICS | 3 |
| ! | PHY 45201 | ELECTROMAGNETIC THEORY | 4 |
| | | **Credit Hours** | **15** |
| | **Semester Six** | | |
| ! | PHY 30020 | INTERMEDIATE PHYSICS LABORATORY (WIC) | 2 |
| ! | PHY 45301 | THERMAL PHYSICS | 3 |
| ! | PHY 45403 | DATA ANALYSIS AND COMPUTATIONAL PHYSICS TECHNIQUES | 3 |
| ! | PHY 46101 | QUANTUM MECHANICS | 4 |
| | Physics (PHY) Elective | | 3 |
| | | **Credit Hours** | **15** |
| | **Semester Seven** | | |
| ! | PHY 40092 or PHY 40096 | INTERNSHIP IN PHYSICS (ELR) or INDIVIDUAL INVESTIGATION (ELR) | 2 |
| | Physics (PHY) Elective | | 2 |
| | Kent Core Requirement | | 3 |
| | Kent Core Requirement | | 3 |
| | General Elective | | 3 |
| | | **Credit Hours** | **13** |
| | **Semester Eight** | | |
| ! | PHY 40020 | ADVANCED PHYSICS LABORATORY (WIC) | 2 |
| | Physics (PHY) Upper-Division Electives (30000 or 40000 level) | | 4 |
| | Kent Core Requirement | | 3 |
| | General Electives | | 5 |
| | | **Credit Hours** | **14** |
| | | **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. | |
| 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 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 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.

# Full Description

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

The Physics major comprises the following concentrations:

- The **Applied Physics** concentration prepares students for immediate entry into careers in industry. Course requirements include electronics, introduction to computer programming, and data analysis and computational physics techniques. While rooted in the basic principles of physics, this program is optimized for students concerned with the application of physics in practical devices and systems.
- 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 for 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 for 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 **Mathematical Physics** concentration is interdisciplinary and provides students with a strong understanding of applied physical theory, its applications and the underlying mathematics. This training, valuable for start-up positions with a number of industries, may also serve as preparation for graduate work in either physics or 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.
- The **Research** concentration prepares majors for further study at the graduate level. This program 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. Academic assessment and GRE scores keep the program up-to-date via curricular revisions. This program is a popular stepping stone to graduate degrees not only in physics, but also in engineering, astronomy/astrophysics and materials science.