

## FACULTY

**Chairperson:** Associate Professor Martina Arndt  
**Graduate Program Coordinator:** Professor Jeffrey Williams  
**Professor:** Edward Deveney  
**Associate Professor:** Thomas Kling  
**Department Telephone Number:** 508.531.1386  
**Location:** Conant Science Building, Room 115A  
**Web site:** [www.bridgew.edu/physics](http://www.bridgew.edu/physics)

## DEGREE PROGRAMS

- BA in Physics  
Concentration: General Physics
- BS in Physics  
Concentration: Professional Physics
- MAT - Physical Science
- MAT - Physics

## UNDERGRADUATE MINORS

- Physics
  - Geophysics\*
- \*Interdisciplinary Minor

The Department of Physics strives to provide students with the necessary skills and knowledge to pursue successful careers in research, teaching or further study in graduate programs. Programs in physics culminating in the degrees of Bachelor of Arts, Bachelor of Science and Master of Arts in Teaching are offered.

## UNDERGRADUATE PROGRAMS

### BACHELOR OF ARTS/BACHELOR OF SCIENCE

The Department of Physics offers programs leading to the bachelor's degree in physics. A major in physics provides students with the necessary skills and knowledge to pursue successful careers in research, teaching, graduate and professional programs, industry, engineering and many other fields. Each student can plan a physics program with the help of a faculty adviser to meet specific future needs. The department also offers students opportunities in on-campus research and internships.

Students who are contemplating majoring in this department should be aware of the sequential nature of the course offerings. It is of prime importance that students consult with the chairperson of the department as soon as possible so that they can complete degree requirements in four years.

## PHYSICS MAJOR

The Department of Physics offers two physics concentrations: a **professional physics concentration** and a **general physics concentration**. Both concentrations have a core set of seven physics courses along with cognate courses in mathematics and chemistry.

## PHYSICS CORE

All physics majors take the physics core courses and core cognates.

	Credits
PHYS 243-244 General Physics I-II.....	8
PHYS 401 Modern Physics.....	4
PHYS 402 Quantum Mechanics.....	3
PHYS 414 Experimental Physics.....	3
PHYS 438 Electricity and Magnetism.....	3
PHYS 439 Mechanics.....	3

### Core Cognates

CHEM 141-142 Chemical Principles I-II.....	8
MATH 151-152 Calculus I-II.....	6
Total minimum credits: 38	

### Core Curriculum Requirements

A minimum of 120 earned hours is required for graduation. These earned hours include the core curriculum requirements as specified in the "Undergraduate Academic Programs" section of this catalog and at the Core Curriculum Web site, [www.bridgew.edu/corecurriculum](http://www.bridgew.edu/corecurriculum). For additional graduation requirements, see the "Undergraduate Academic Policies" section of this catalog.

## PROFESSIONAL PHYSICS CONCENTRATION

The physics major with a professional physics concentration is designed to meet the needs of students going to graduate school in physics or a related field, or jobs in science or engineering.

Requirements	Credits
Physics core courses.....	24
Physics core cognates.....	14

### Electives

12 credit hours of physics electives above the 100 level from the list below.....	12
PHYS 403 Mathematical Physics	
PHYS 405 Nuclear Physics	
PHYS 409 General Relativity and Cosmology	
PHYS 422 Computer Simulation in Physical Science	
PHYS 433 Thermal Physics	
PHYS 435 Optics	
PHYS 442 Digital Electronics I	
PHYS 458 Advanced Electricity and Magnetism	
PHYS 459 Advanced Mechanics	
PHYS 460 Advanced Quantum Mechanics	
PHYS 498 Internship in Physics	
PHYS 499 Directed Study in Physics	

## Cognates

MATH 251 Calculus III .....	3
MATH 316 Differential Equations.....	3
Total minimum credits: 56	

## GENERAL PHYSICS CONCENTRATION

The physics major with a general physics concentration is designed to meet the needs of students seeking jobs in teaching, engineering, industry, computers, finance, biology, medicine, law and many other fields. It also would be an effective major to combine with many of the minors offered at the college. Along with the physics core and physics core cognate courses, the student must take six hours of physics electives from the list below.

Cognates	Credits
Physics core courses.....	24
Physics core cognates.....	14
<b>Physics Electives</b> .....	6
PHYS 107 Exploring the Universe	
PHYS 180 Energy and its Social Uses	
PHYS 403 Mathematical Physics	
PHYS 405 Nuclear Physics	
PHYS 409 General Relativity and Cosmology	
PHYS 422 Computer Simulation in Physical Science	
PHYS 433 Thermal Physics	
PHYS 435 Optics	
PHYS 442 Digital Electronics I	
PHYS 458 Advanced Electricity and Magnetism	
PHYS 459 Advanced Mechanics	
PHYS 460 Advanced Quantum Mechanics	
PHYS 498 Internship in Physics	
PHYS 499 Directed Study in Physics	
Total minimum credits: 44	

## PHYSICS MINOR

18 credits in physics acceptable for the physics major.  
Total minimum credits: 18

## GEOPHYSICS MINOR

A minor is jointly offered with the Departments of Earth Sciences and Geography. For further information contact the department chairpersons.

## DOUBLE MAJOR WITH ELEMENTARY EDUCATION, EARLY CHILDHOOD EDUCATION OR SPECIAL EDUCATION

Students may choose a double major in physics and elementary education, early childhood education or special education for licensure purposes. Please contact the Department of Physics and the appropriate education department for further information.

## MINOR IN SECONDARY EDUCATION (HIGH SCHOOL, MIDDLE SCHOOL OR PREK-12 SPECIALIST)

Students may minor in secondary education (high school, middle school or PreK-12 specialist). Successful completion of this minor, the program requirements of either a BA or BS in physics and PHYS 107 Exploring the Universe will lead to Massachusetts Initial Teacher Licensure. Please refer to the "Department of Secondary Education and Professional Programs" for specific teacher licensure requirements.

## HONORS PROGRAM

The honors program in physics provides highly motivated physics majors with opportunities to enhance their academic program through intensive scholarly study and research designed to be of assistance in postgraduate employment or in the pursuit of an advanced degree in physics. Contact the Department of Physics for further information concerning eligibility and application.

## GRADUATE PROGRAMS

### MASTER OF ARTS IN TEACHING PHYSICS

The Master of Arts in Teaching degree in physics in was developed for high school and middle school subject area teachers who have an initial license and are seeking a professional license in the Commonwealth of Massachusetts. This MAT program is designed to meet the "appropriate master's degree" requirement, which is part of the criteria for professional stage licensure, as set forth in the most recent MA DESE licensure regulations.

Students should consult the "School of Graduate Studies" section of the catalog for information regarding graduate program policies and procedures.

### Admission Requirements

- A minimum undergraduate GPA of 2.75 based upon four years of work or a 3.0 undergraduate GPA based upon work completed during the junior and senior years
- A composite score of 900 on the quantitative and verbal parts of the GRE General Test
- An initial teaching license
- Three appropriate letters of recommendation
- Official transcripts of all undergraduate and graduate course work

All accepted students must enroll under the direction of their adviser in GRPP 501 Graduate Program Planning, which is described under "Graduate Advisers and Graduate Program Planning" in the "School of Graduate Studies" section of this catalog.

## Program Requirements Credits

GRPP 501 Graduate Program Planning ..... 1

### Education Core Courses

EDMC 530 The Teacher as Researcher ..... 3  
 EDMC 531 The Standards-Based Classroom: Curriculum ..... 3  
 EDMC 532 The Teacher as Leader: From Issues to Advocacy ..... 3  
 EDMC 533 The Standards-Based Classroom: Instruction and Assessment for Diverse Learners ..... 3  
 EDMC 538 The Professional Teacher (final program course) ..... 3

### Concentration Electives

MAT students are expected to have, or acquire in addition to degree requirements, an appropriate background of college level courses, to be determined by the department.

A minimum of 18 approved graduate credits in the academic area of concentration, which meet the academic and professional objectives of the student, is required ..... 18  
 Successful completion of a comprehensive examination is also required.

Total minimum credits: 34

## MASTER OF ARTS IN TEACHING GENERAL SCIENCE

This program is inactive.

## MASTER OF ARTS IN TEACHING PHYSICAL SCIENCE

The Master of Arts in Teaching degree in physical science degree was developed for high school and middle school subject area teachers who have an initial license in chemistry, earth science or physics and are seeking a professional license in the Commonwealth of Massachusetts. This MAT program is defined to meet the "appropriate master's degree" requirement, which is part of the criteria for professional stage licensure, as set forth in the most recent Massachusetts Department of Elementary and Secondary Education licensure regulations.

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- An initial teaching license
- Three appropriate letters of recommendation
- Official transcripts of all undergraduate and graduate course work

## Program requirements

### Education Core Courses

Credits

EDMC 530 The Teacher as Researcher ..... 3  
 EDMC 531 The Standards-Based Classroom: Curriculum ..... 3  
 EDMC 532 The Teacher as Leader: From Issues to Advocacy ..... 3  
 EDMC 533 The Standards-Based Classroom: Instruction and Assessment for Diverse Learners ..... 3  
 EDMC 538 The Professional Teacher (final program course) ..... 3

### Introductory course

PHSC 501 Problem Solving in Physical Science ..... 3

### Concentration Electives

Twelve (12) credits in electives at least three credits from each area ..... 12

#### Chemistry

CHEM 512 Microcomputers as Laboratory Instruments  
 CHEM 550 Chemistry and the Environment

#### Earth Science

EASC 501 Observational Astronomy  
 EASC 504 Observational Meteorology  
 EASC 550 Modern Developments in Earth Science  
 EASC 560 Special Topics in Earth Science

#### Physics

PHYS 550 Physics for Teachers-A Modern Review  
 PHYS 560 Special Topics in Physics Teaching  
 PHYS 581 The Physics of the Environment  
 PHYS 593 Special Topics in Secondary School Science  
 or  
 PHYS 594 Special Topics in Junior High Science I

### Capstone course

PHSC 590 Integrated Physical Science ..... 3

Total minimum credits: 33