
PHYSICS

FACULTY

Chairperson and Graduate Program

Coordinator: Professor Jeffrey Williams

Associate

Professors: Martina Arndt, Edward Deveney

Assistant

Professor: Thomas Kling

Department Telephone Number: 508.531.1386

Location: Conant Science Building, Room 115A

Web site: www.bridgew.edu/physics

DEGREE PROGRAMS

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

cific 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 physics department 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

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

Core Cognates:

- CHEM 141-142 Chemical Principles I-II
- MATH 151-152 Calculus I-II

Core Curriculum Requirements

A minimum of 120 earned hours is required for graduation. These earned hours include Core Curriculum Requirements as specified in the "Undergraduate Academic Programs" section of this catalog. 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

- Physics core courses
- Physics core cognates
- Electives: 12 credit hours of physics electives above the 100 level from the list below

Cognates:

- MATH 251 Calculus III
- MATH 316 Differential Equations

School of Arts and Sciences

Note: See Catalog Web Addenda at www.bridgew.edu/catalog/addenda/ as that information supersedes the published version of this catalog.

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.

Physics Electives

- 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 432 Electronic Circuits
- 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

PHYSICS MINOR

18 credits in physics acceptable for the physics major.

GEOPHYSICS MINOR

A minor is jointly offered with the Department 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 post-graduate 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

Graduate Program Coordinator: Dr. Jeffrey Williams

MASTER OF ARTS IN TEACHING PHYSICS

The Master of Arts in Teaching Physics degree 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 DOE licensure regulations.

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

Admission Requirements

- 1.) A 2.75 undergraduate GPA based upon four years of work or a 3.0 undergraduate GPA based upon work completed during the junior and senior years.
- 2.) A composite score of 900 on the quantitative and verbal parts of the GRE General Test.
- 3.) An initial teaching license.
- 4.) Three appropriate letters of recommendation

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

Education Core Courses

15 credits

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

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.

Successful completion of a comprehensive examination is also required.

MASTER OF ARTS IN TEACHING GENERAL SCIENCE

The Master of Arts in Teaching General Science program is designed to advance the teaching skills and content knowledge of middle school teachers. This MAT concentration includes four science areas: physical science, life science, earth/space science and technology engineering. This degree will enable middle school generalists to become highly qualified middle school science specialists.

Admission requirements:

- 1.) A 2.75 undergraduate GPA based upon four years of work or a 3.0 undergraduate GPA based upon work completed during the junior and senior years.
- 2.) A composite score or 900 on the quantitative and verbal parts of the GRE General Test
- 3.) An initial teaching license
- 4.) Three appropriate letters of recommendation

Program Requirements:

Education Core Courses (15 credits)

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

Concentration Courses

Introductory course (3 credits)

- GSCI 501 Problem Solving in Science for the Middle School Teacher

Content distribution courses (12 credits)

- GSCI 504 Topics in Life Sciences for the Middle School Teacher
- or
- BIOF 508 Special Topics in Middle School Life Science (3 credits)
- GSCI 505 Topics in Physical Sciences for the Middle School Teacher
- GSCI 506 Topics in Earth/Space Sciences for the Middle School Teacher
- GSCI 507 Topics in Technology/Engineering for the Middle School Teacher

Capstone Course (3 credits)

- GSCI 508 Integrated Science for the Middle School Teacher

MASTER OF ARTS IN TEACHING PHYSICAL SCIENCE

The MAT 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 Education licensure regulations.

Students should consult the “School of Graduate Studies” section of this catalog for information regarding program policy and procedures.

Admission requirements:

- 1.) A 2.75 undergraduate GPA based upon four years of work or a 3.0 undergraduate GPA based

upon work completed during the junior and senior years

- 2.) A composite score of 900 on the quantitative and verbal parts of the GRE General Test
- 3.) An initial teaching license
- 4.) Three appropriate letters of recommendation

Program requirements:

Education Core Courses

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

Concentration Electives

Introductory course (3 credits)

PHSC 501 Problem Solving in Physical Science

**Four electives with at least one from each area
(12 credits)**

Chemistry

- CHEM 512 Microcomputers as Laboratory Instru-
ments
CHEM 550 Chemistry and the Environment
CHEM 560 Special Topics in Chemistry

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