



# Becoming a Physics Teacher

## Routes to New York State Certification

The State University of New York at Stony Brook offers two programs registered and approved by the New York State Education Department for individuals seeking New York State certification to teach physics in secondary schools, grades 7 – 12.

The **undergraduate** route to certification requires completion of a Bachelor of Science in Physics degree with a secondary education minor.

The **graduate** route to certification requires completion of the Master of Arts in Teaching degree with specialization in physics, which implies previous completion of science course requirements equivalent to the Stony Brook Bachelor of Science in Physics degree.

In addition we expect NYSED approval soon of a new program:

The **BS/MAT** route to certification in which students obtain both BS and MAT degrees with one additional year beyond the time expected for the BS alone.

The Stony Brook programs are aligned with the standards of the National Association of Teachers of Science (NSTA), National Council for Accreditation of Teacher Education (NCATE), the National Educators Association (NEA) Code of Ethics, Interstate New Teacher Assessment and Support Consortium (INTASC), and the National Board for Professional Teacher Standards (NBPTS).

For advisement on program requirements, contact Physics Education Advisor, Robert McCarthy, at (631) 632-8086 or [Robert.McCarthy@stonybrook.edu](mailto:Robert.McCarthy@stonybrook.edu) or stop by the Department of Physics in Room 110 of the Graduate Physics Building. For advisement on education courses and training, contact Linda Padwa, the Director of the Science Education Program, at (631) 632-7075 or [Linda.Padwa@stonybrook.edu](mailto:Linda.Padwa@stonybrook.edu).

## **Undergraduate Physics Teacher Preparation Program Degree and Certification Requirements**

The undergraduate physics teacher preparation program is based on completion of a B.S. in Physics degree with supplemental required classes. The degree requires a strong foundation in physics and mathematics, comprising at least 63 physics, math and related credits. Among these related credits, teacher candidates take courses in biology, chemistry, and earth science, which are beyond the requirements for the physics major. The current physics major requires 37 credits with the PHY designator. All students are encouraged to undertake research. Laboratory work comprises a significant portion of the degree credits and an exhibition of written expression is required. (Students who will receive the BS under old rules must receive at least 36 credits of PHY courses for the education minor, as required by the state.)

All applicants to the Physics Teacher Preparation Program must:

- Contact the Physics Education Advisor for a transcript review and to plan a course of study.
- Achieve a 2.75 cumulative GPA and a 2.75 GPA in science courses.
- Have three letters of reference from university faculty regarding the student's potential as a teacher.
- Declare a Science Education minor by submitting the "Declaration of Major/Minor Form" to the Registrar. Forms are available at the Registrar's Office, departmental offices, and at the Science Education Program Office, Life Sciences 001.
- Fill out the Student Information Form. Attach an unofficial copy of your transcript(s) and your writing sample essay and submit all documents for approval by the Science Education Program Director prior to admission to SCI 410.
- Have taken at least 4 science lab courses.

## Physics Content for Teacher Preparation

(same as for B.S. in Physics)

### A. Required Laboratory Courses:

PHY 131/133, 132/134 Classical Physics I, II and Laboratory (see note)

PHY 251/252 Modern Physics Lecture and Laboratory

PHY 277 Computation for Physics and Astronomy

PHY 300 Waves and Optics

PHY 335 Electronics and Instrumentation Laboratory

PHY 445 Senior Laboratory I

Note: The three semester PHY 125/126/ 127 sequence or the Honors 141/142 sequence may be substituted for PHY 131/133, 132/134.

### B. Required Lecture Courses:

PHY 301 Electromagnetic Theory

PHY 303 Mechanics

PHY 306 Thermodynamics, Kinetics Theory, and Statistical Mechanics

PHY 308 Quantum Physics

All PHY courses required for the major must be completed with a grade of C or higher, except that at most three courses at the 100 or 200 level can be completed with a grade of C-. At least four of these courses numbered 300 and above must be taken at Stony Brook.

The above physics requirements total 37 credits.

### C. Courses in Mathematics:

Equivalency for MAT courses achieved on the Mathematics Placement Examination is accepted as fulfillment of the corresponding requirements without the necessity of substituting other credits.

1. One of the following sequences:

MAT 131, 132 Calculus I, II or MAT 141, 142 Honors Calculus I, II or MAT 125, 126, 127 Calculus A, B, C

2. One of the following:

MAT 205 Calculus III, or MAT 203 Calculus III with Applications, or AMS 261 Applied Calculus III

3. One of the following:

MAT 305 Calculus IV, or MAT 303 Calculus IV with Applications, or AMS361 Applied Calculus IV: Differential Equations

The above mathematics requirements total 14 credits.

#### **D. Courses in Related Fields:**

Twelve credits of acceptable physics-related courses that complement the physics major are required. A list of acceptable courses, which include courses for teacher preparation, is posted in the Physics and Astronomy Undergraduate Office.

#### **Notes:**

1. Students taking the PHY 125, 126, 127 sequence will have to delay portions of their program by one semester.
2. Students are encouraged to include biology (BIO 150, 201, 202) and Chemistry (CHE 198 or CHE 131, 132) among their electives. Teacher candidates should include one Earth Sciences course.

### **Professional Education Requirements**

#### **E. Interdisciplinary Seminar Series:**

The Nature of Science and the Human Endeavor (4 sessions, 0 credits).  
See advisor for each semester's schedule.

#### **F. Required Courses on Professional Studies in Education:**

SSE 327 Middle Childhood/Adolescent Development  
SSE 350 Foundations in Education  
LIN 344 Language Acquisition and Literacy Development  
SCI 410 Pedagogy and Methods in Science Education I  
SCI 449 Field Experience I (co-requisite SCI 410)  
SCI 420 Pedagogy and Methods in Science Education II  
SCI 450 Field Experience II (co-requisite SCI 420)  
SCI 451 Supervised Student Teaching 7 – 9\*\*  
SCI 452 Supervised Student Teaching 10 – 12\*\*  
SCI 454 Student Teaching Seminar

\*\* Note: 75 days of student teaching are required. Dependent on the semester and public school vacation schedules, student teaching may extend beyond the university semester calendar.

Prior to admission to student teaching candidates will be interviewed by a committee to assess their ability to speak extemporaneously about both physics concepts and pedagogical issues. Students who are not successful in this interview will be counseled in order to remedy deficiencies. Upon completion of the remediation another interview will be held. In the event that a student is unable to satisfy the interview component, the student will not advance to student teaching until this requirement is satisfied.

### **G. Field Experience:**

Field Experience sites for all teacher candidates are arranged through SCI 449 and SCI 450. Assignments and details are distributed in SCI 410 and SCI 420. New York State requires 100 hours of field experience in partnership schools prior to student teaching

### **H. State Tests, Mandated Seminars and Fingerprinting:**

All students must earn a passing grade on the Liberal Arts and Sciences Test (LAST) component of the New York State Teacher Certification Exams (NYSTCE) prior to student teaching. Before completing the program, students must not only pass the Content Specialty Test (CST) in physics, they must score at least 220 on all sections of the exam. Students with scores lower than 220 on any section of the CST must pass an alternate exam on the concepts of that section administered by the Physics Education Advisor. The Assessment of Teaching Skills, Written (ATS-W) is also required prior to certification. For further information about the NYSTCE program, contact the School of Professional Development at 631-632-7055 or visit their website at [www.sunysb.edu/spd](http://www.sunysb.edu/spd).

All students must be fingerprinted and complete three mandated seminars, Training in Child Abuse Recognition, Substance Abuse Education, and School Violence and Intervention, prior to student teaching. (See <http://www.sunysb.edu/spd/career/tworkshops.html> for details.)

### **I. Language Requirement:**

New York State certification requires at least one year of college level study of a foreign language. Satisfaction of SBU's DEC Entry Skill 3 fulfills this requirement.

### **J. Professional Portfolio:**

The Professional Portfolio is presented and defended at the conclusion of student teaching. It includes many performance indicators of standards-based teaching competencies.

## Master of Arts in Teaching Physics

For an admission application to the Master of Arts in Teaching degree program, contact the School of Professional Development at (631) 632-7055, or download an application from [www.sunysb.edu/spd](http://www.sunysb.edu/spd).

Please note that all Masters students seeking physics teacher certification must earn the equivalent of the Stony Brook B.S. in physics degree and meet all undergraduate physics teacher preparation program requirements. For details, see the Physics Education Advisor.

The MAT in physics requires 15 credits in appropriate physics courses, chosen in consultation with the Physics Education Advisor, including PHY515 and PHY570. Since a major in physics is required for entry into the program, our entering students already have some knowledge of all areas of physics. MAT students can therefore pursue their interests in selecting specialized courses that extend their content knowledge. MAT students most frequently select the following courses listed below. In addition there are 29 other graduate courses in physics among which an MAT student could also choose if they have the appropriate quantitative background. The graduate course descriptions can be viewed at the physics website: <http://www.physics.sunysb.edu/physics>.

### A. Physics Courses

Required courses:

- PHY 515 Methods of Experimental Research I
- PHY 570 Introductory Physics Revisited for Teachers

Recommended Courses:

- PHY 571 Electromagnetic Theory for Teachers
- PHY 573 Mechanics for Teachers
- PHY 576 Thermodynamics and Statistical Mechanics for Teachers
- PHY 578 Quantum Physics for Teachers
- PHY 579 Special Topics for Teachers
- PHY 501 Classical Mechanics
- PHY 505/506 Classical Electrodynamics
- PHY 511/512 Quantum Mechanics
- PHY 514 Current Research Instruments
- PHY 516 Methods of Experimental Research II
- PHY 521 Stars
- PHY 522 Interstellar Medium
- PHY 523 Galaxies
- PHY 524 Cosmology
- PHY 580 Special Research Projects
- PHY 582 Optics Rotation
- PHY 585 Special Study

## Professional Education Requirements

### **B. Interdisciplinary Seminar Series:**

The Nature of Science and the Human Endeavor (4 sessions, 0 credits).

See advisor for each semester's schedule.

### **C. Required Professional Studies in Education Courses:**

CEE 505 Education: Theory and Practice

CEE 565 Human Development

LIN 544 Language Acquisition and Literacy Development

SCI 510 Pedagogy and Methods in Science Education I

SCI 549 Field Experience I (co-requisite SCI 510)

SCI 520 Pedagogy and Methods in Science Education II

SCI 550 Field Experience II (co-requisite SCI 520)

SCI 551 Supervised Student Teaching 7 – 9\*\*

SCI 552 Supervised Student Teaching 10 – 12\*\*

SCI 554 Student Teaching Seminar

\*\* Note: 75 days of student teaching are required. Dependent on the semester and public school vacation schedules, student teaching may extend beyond the university semester calendar.

Prior to admission to student teaching candidates will be interviewed by a committee to assess their ability to speak extemporaneously about both physics concepts and pedagogical issues. Students who are not successful in this interview will be counseled in order to remedy deficiencies. Upon completion of the remediation another interview will be held. In the event that a student is unable to satisfy the interview component, the student will not advance to student teaching until this requirement is satisfied.

### **D. Field Experience:**

Field Experience sites for all teacher candidates are arranged through SCI 549 and SCI 550.

Assignments and details are distributed in SCI 510 and SCI 520. New York State requires 100 hours of field experience in partnership schools prior to student teaching

### **E. State Tests, Mandated Seminars and Fingerprinting:**

All students must earn a passing grade on the Liberal Arts and Sciences Test (LAST) component of the New York State Teacher Certification Exams (NYSTCE) prior to student teaching. Before completing the program, students must not only pass the Content Specialty Test (CST) in physics, they must score at least 220 on all sections of the exam. Students with scores lower than 220 on any section of the CST must pass an alternate exam on the concepts of that section administered by the content Physics Education Advisor. The Assessment of Teaching Skills, Written (ATS-W) is also required prior to certification. For further information about the NYSTCE program, contact the School of Professional Development at 631-632-7055 or visit their website at [www.sunysb.edu/spd](http://www.sunysb.edu/spd).

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**F. Language Requirement:**

New York State certification requires at least one year of college level study of a foreign language.

**G. Professional Portfolio:**

The Professional Portfolio is presented and defended at the conclusion of student teaching. It includes many performance indicators of standards-based teaching competencies and a Master's essay.