



Stony Brook University

# Becoming a Physics Teacher

## Three Routes to New York State Certification

Stony Brook University offers three 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 the Teacher Preparation option. (See page 2)

The **graduate** route to certification requires completion of the Master of Arts in Teaching Physics degree, as well as completion of science course requirements equivalent to the Stony Brook Bachelor of Science in Physics degree. (See page 6)

The **combined** route to certification in which students obtain both the Bachelor of Sciences in Physics and Master of Arts in Teaching Physics degrees in 5 years, i.e., one additional year beyond that needed for the BS alone. (See page 8)

The Stony Brook programs are aligned with the standards of the National Science Teachers Association (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, contact Keith Sheppard, Director of the Science Education Program, at (631) 632-2989 ([Keith.Sheppard@stonybrook.edu](mailto:Keith.Sheppard@stonybrook.edu)) or Linda Padwa at (631) 632-7075 ([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 BS 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.) Students must pass all PHY courses with a minimum grade of C. New York State will not accept a C- or lower for teacher certification.

All applicants to the Physics Teacher Preparation Program must:

- Apply to the program during the second semester of sophomore year or first semester of junior year.
- Have taken at least 4 science lab courses.
- Contact the physics education advisor for a transcript review and to plan a course of study.
- Achieve a cumulative GPA of 2.75 and a GPA of 2.75 in science courses.
- Contact one of the science education program advisors for an interview.
- Fill out the Professional Education Program Undergraduate Application Form (see <http://www.sunysb.edu/pep/docs/UnderAppForm.doc>). Attach an unofficial copy of your transcript(s) from all colleges and universities that you have attended, three letters of reference from university faculty regarding your potential to become a teacher, and your essay. Submit all documents for approval by the Science Education Program Director.
- Declare a Teacher Preparation option by submitting the “Declaration of Major/Minor Form” with TP to the Registrar. Forms are available at the Registrar’s Office, the Undergraduate Physics advisor’s office in the Physics Building, and the Science Education Program Office, Life Sciences 001.

**Physics Content for Teacher Preparation** (almost the same as for BS 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.

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 AMS 361 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 PHY125, 126, 127 sequence may have to delay portions of their program, because of the prerequisite structure in physics courses. (It may be possible to recover by taking a class in summer school.)
2. Students *must* include among their electives one semester of biology (BIO 201 *or* BIO 202), and Chemistry [CHE 131/133 (students are encouraged to take CHE 132 and CHE 134)], and one of the following Earth Science course combinations: GEO 102/112, *or* GEO 122 *or* AST 101/112 *or* ATM 102 *or* ATM 105.
3. To qualify for the General Science (7-12) certification, candidates must complete a minimum of 18 semester hours in two or more sciences other than physics. Additional elective courses may be needed to meet this requirement.

**E. Interdisciplinary Seminar Series:**

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

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

PSY 327 Human Development in an Educational Context  
SSE 350 Foundations in Education  
LIN 344 Language Acquisition and Literacy Development  
CEF 347 Introduction to Special Education  
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: 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. Candidates 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 candidate is unable to satisfy the interview component, the candidate will not advance to student teaching.

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. Student teaching is divided into two placements of approximately equal duration, one in a middle school/junior high school and the other in a high school.

### **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 secondary schools prior to student teaching. Each teacher candidate is required to obtain 15 hours of field experience that includes a focus on understanding the needs of students with disabilities. These hours will be noted on the Field Experience Time Sheets from SCI 449, SCI 450, or a combination of both. In earning these field experience hours, teacher candidates will be encouraged to observe inclusion (integrated co-teaching) classes in their certification area and other special education classroom situations as available

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

- All teacher candidates must be fingerprinted during SCI 410.
- Prior to student teaching, candidates must complete three mandated seminars, *Training in Child Abuse Recognition, Substance Abuse Education, and School Violence and Intervention*. For details see <http://www.sunysb.edu/spd/career/tworkshops.html>.

New York State is in the process of modifying the examinations required for teacher certification, effective May 2014. Details are not yet available but will be discussed in Methods classes as soon as the new examinations are finalized.

For those graduating prior to May 2014, the following test regimen is in place:

- Prior to Student Teaching placement, candidates must earn a passing grade (220 or higher) on the Liberal Arts and Sciences Test (LAST) component of the New York State Teacher Certification Exams (NYSTCE).
- In order to qualify for certification, candidates must pass the Content Specialty Test (CST) in physics with a minimum score of 220. It is a program requirement that candidates with a score lower than 220 on any sub-section of the CST must pass an alternate exam on the concepts of that section which will be administered by departmental faculty
- The Assessment of Teaching Skills, Written (ATS-W) is required prior to certification.
- For further information about the NYSTCE testing program, visit their website at <http://www.nystce.nesinc.com/>.

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

New York State certification requires at least one year (6 credits) 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.stonybrook.edu/spd](http://www.stonybrook.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, entering students will 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 from the courses listed below. In addition there are many other graduate courses in physics from which an MAT student could also choose if they have the appropriate quantitative background. The graduate course descriptions can be viewed at the physics department website: [www.physics.sunysb.edu/physics](http://www.physics.sunysb.edu/physics)

### A. Physics Courses:

Required courses:

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

Recommended Courses:

- PHY 514 Current Research Instruments
- 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 580 Special Research Projects
- PHY 582 Optics Rotation
- PHY 585 Special Study
- PHY 600 Practicum in Teaching

## Physics Teacher Preparation Information Pack

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

The Nature of Science and the Human Endeavor (4 sessions, 0 credit, required)

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

CEE 505 Education: Theory and Practice

PSY 595 Human Development

LIN 544 Language Acquisition and Literacy Development

CEF 547 Principles and Practices of Special Education

SCI 510 Introduction to Science Teaching (Methods of Teaching 1)

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

SCI 520 Science Instructional Strategies & Techniques (Methods of Teaching 2)

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

SCI 551 Supervised Student Teaching 10 – 12\*\*

SCI 552 Supervised Student Teaching 7 – 9\*\*

SCI 554 Student Teaching Seminar\*\*

**\*\* Note:** 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. Candidates 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 candidate is unable to satisfy the interview component, the candidate will not advance to student teaching.

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. Student teaching is divided into two placements of approximately equal duration, one in a middle school/junior high school and the other in a high school.

### **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 secondary schools prior to student teaching. Each teacher candidate is required to obtain 15 hours of field experience that includes a focus on understanding the needs of students with disabilities. These hours will be noted on the Field Experience Time Sheets from SCI 549, SCI 550, or a combination of both. In earning these field experience hours, teacher candidates will be encouraged to observe inclusion (integrated co-teaching) classes in their certification area and other special education classroom situations as available

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

- All teacher candidates must be fingerprinted during SCI 510.
- Prior to student teaching, candidates must complete three mandated seminars, *Training in Child Abuse Recognition*, *Substance Abuse Education*, and *School Violence and Intervention*. For details see <http://www.sunysb.edu/spd/career/tworkshops.html>.

New York State is in the process of modifying the examinations required for teacher certification, effective May 2014. Details are not yet available but will be discussed in Methods classes as soon as the new examinations are finalized.

For those graduating prior to May 2014, the following test regimen is in place:

## Physics Teacher Preparation Information Pack

- Prior to Student Teaching placement, candidates must earn a passing grade (220 or higher) on the Liberal Arts and Sciences Test (LAST) component of the New York State Teacher Certification Exams (NYSTCE).
- In order to qualify for certification, candidates must pass the Content Specialty Test (CST) in physics with a minimum score of 220. It is a program requirement that candidates with a score lower than 220 on any sub-section of the CST must pass an alternate exam on the concepts of that section which will be administered by departmental faculty
- The Assessment of Teaching Skills, Written (ATS-W) is required prior to certification.
- For further information about the NYSTCE testing program, visit their website at <http://www.nystce.nesinc.com/>.

### **F. Language Requirement:**

New York State certification requires at least one year (6 credits) 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.

### **H. General Science Certification:**

In order to qualify for the General Science (grade 7 – 12) certification, candidates must complete a minimum of 18 semester hours (undergrad or grad) in two or more sciences other than physics.]

### **I. Middle Level Extension**

Candidates who wish to qualify to teach grades 5 and 6 in a middle school setting may obtain an extension to their grades 7-12 certification by completing two additional courses prior to graduation. The courses are: CEE 601 Early Adolescent Development and CEE 602 Middle Child Education-Instruction. More information about these courses can be found on the SPD website ([www.stonybrook.edu/spd](http://www.stonybrook.edu/spd)).



## **Five-Year BS/MAT Physics Teacher Preparation Program Degree and Certification Requirements**

The BS/MAT physics teacher preparation program is based on completion of a combined BS in Physics and Master of Arts in Teaching in Physics. It is possible to complete both degrees in 5 years (instead of 5 ½ years) because of credit sharing between the programs. This program requires a combination of the courses that satisfy the requirements of both programs. See both the BS teacher preparation program (p. 2) and the MAT program (p. 6). Students in the BS/MAT program, with the consent of the physics education advisor, satisfy some of their requirements for the BS by taking appropriate graduate courses, each of which contains the content of a required undergraduate course plus additional requirements.

All applicants to the BS/MAT Physics Teacher Preparation Program must:

- Complete the BS/MAT application that is found on the School of Professional Development web site ([www.sunysb.edu/spd](http://www.sunysb.edu/spd)).
  - SPD Student Application/Information Sheet
  - Three (3) letters of recommendation
  - Official transcript from each college or university attended
  - Application Essay
  - Any additional items required by the School of Professional Development
- Submit application prior to SPD deadline (for the SPD website for details: [www.stonybrook.edu/spd](http://www.stonybrook.edu/spd))

Upon entry to the program, candidates must declare a Teacher Preparation option along with their Undergraduate major by submitting the “Declaration of Major/Minor Form” with TP to the Registrar. Forms are available at the Registrar’s Office, the Undergraduate Physics advisor’s office in the Physics Department Office, and the Science Education Program Office, Life Sciences 001.

### **Number of semesters of full-time study required for program completion at the undergraduate and graduate levels.**

Students should apply to the combined BS/MAT program during their fifth or sixth semester of study. The first six semesters of the program are full time study at the undergraduate level. Semesters seven and eight will include a mix of undergraduate and graduate courses. Semesters nine and ten will consist of graduate courses only. Candidates will generally advance to Graduate status during their eighth semester.

Note: The two degrees are conferred only when the entire combined degree program has been completed. Both degrees are conferred together unless the student elects to exit the combined degree program and receive only a BS in Physics.

## Five Year BS/MAT Program – Sample Course Sequence

	UG	G		UG	G
<b>Semester 1</b>			<b>Semester 6</b>		
PHY 131/133, DEC E	4		PHY 306	3	
MAT 131, DEC C	4		DEC	3	
Foreign language*	3		Elective (content)	3	
DEC	3		DEC	3	
SBU 101	1		DEC	3	
<b>Semester 2</b>			<b>Semester 7</b>		
PHY 132/134, DEC E	4		PHY 335	3	
MAT 132	4		PHY 573		3
Foreign language*	3		Elective (content)	3	
DEC	3		DEC	3	
DEC	3		DEC	3	
<b>Semester 3</b>			<b>Semester 8</b>		
PHY 251/252	4		PHY 578		3
MAT 205	3		PHY 570		3
CHE 131/133	5		PSY 595		3
DEC	3		SCI 410	3	
DEC	3		SCI 449	1	
<b>Semester 4</b>			LIN 344	3	
PHY 300	4		<b>Semester 9</b>		
MAT 305	3		PHY 580		3
CHE 132/134	5		PHY 515		3
BIO 201/202	3		CEE 505		3
DEC	3		SCI 520		3
<b>Semester 5</b>			SCI 550		1
PHY 301	3		CEF 547		3
MAT 341	3		<b>Semester 10</b>		
GEO 122	4		SCI 551		3
PHY 277	3		SCI 552		3
DEC	3		SCI 554		3

\*Satisfaction of SBU's DEC Entry Skill 3 fulfills the foreign language requirement.

The above listing of courses provides a suggested sequence for coursework. There is a degree of flexibility in the order of courses, but any deviation from the above without permission of physics teacher preparation advisor may lead to a delay in completion of the program.

A student wishing to complete this 5 year combined program is strongly encouraged to consult with the physics teacher preparation advisor for individualized guidance in course selection.

## Additional Requirements

### Interdisciplinary Seminar Series:

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

### Student Teaching:

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. Candidates 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 candidate is unable to satisfy the interview component, the candidate will not advance to student teaching.

Seventy-five days of student teaching are required. Depending on the semester and public school vacation schedules, student teaching may extend beyond the university semester calendar. Student teaching is divided into two placements of approximately equal duration, one in a middle school/junior high school and the other in a high school.

### Field Experience:

Field Experience sites for all teacher candidates are arranged through SCI 449/549 and SCI 450/550. Assignments and details are distributed in SCI 410/510 and SCI 420/520. New York State requires 100 hours of field experience in secondary schools prior to student teaching. Each teacher candidate is required to obtain 15 hours of field experience that includes a focus on understanding the needs of students with disabilities. These hours will be noted on the Field Experience Time Sheets from SCI 449/549, SCI 450/550, or a combination of both. In earning these field experience hours, teacher candidates will be encouraged to observe inclusion (integrated co-teaching) classes in their certification area and other special education classroom situations as available

### State Tests, Mandated Seminars and Fingerprinting:

- All teacher candidates must be fingerprinted during SCI 410/510.
- Prior to student teaching, candidates must complete three mandated seminars, *Training in Child Abuse Recognition*, *Substance Abuse Education*, and *School Violence and Intervention*. For details see <http://www.sunysb.edu/spd/career/tworkshops.html>.

New York State is in the process of modifying the examinations required for teacher certification, effective May 2014. Details are not yet available but will be discussed in Methods classes as soon as the new examinations are finalized.

For those graduating prior to May 2014, the following test regimen is in place:

- Prior to Student Teaching placement, candidates must earn a passing grade (220 or higher) on the Liberal Arts and Sciences Test (LAST) component of the New York State Teacher Certification Exams (NYSTCE).
- In order to qualify for certification, candidates must pass the Content Specialty Test (CST) in physics with a minimum score of 220. It is a program requirement that candidates with a score lower than 220 on any sub-section of the CST must pass an alternate exam on the

## Physics Teacher Preparation Information Pack

concepts of that section which will be administered by departmental faculty

- The Assessment of Teaching Skills, Written (ATS-W) is required prior to certification. For further information about the NYSTCE testing program, visit their website at <http://www.nystce.nesinc.com/>.

### **Language Requirement:**

New York State certification requires at least one year (6 credits) of college level study of a foreign language. Satisfaction of SBU's DEC Entry Skill 3 fulfills the foreign language requirement.

### **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.

### **General Science Certification:**

In order to qualify for the General Science (grade 7 – 12) certification, candidates must complete a minimum of 18 semester hours in two or more sciences other than physics.

### **Middle Level Extension:**

Candidates who wish to qualify to teach grades 5 and 6 in a middle school setting may obtain an extension to their grades 7-12 certification by completing two additional courses prior to graduation. The courses are: CEE 601 Early Adolescent Development and CEE 602 Middle Child Education-Instruction. More information about these courses can be found on the SPD website ([www.stonybrook.edu/spd](http://www.stonybrook.edu/spd)).