



# Becoming a Chemistry Teacher

## Three Routes to New York State Certification

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

The **undergraduate** route to certification requires completion of a Bachelor of Arts in Chemistry degree or a Bachelor of Science in Chemistry degree with the Teacher Preparation option. (See page 2)

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

The **combined** route to certification in which students obtain both the Bachelor of Science in Chemistry and Master of Arts in Teaching degrees in 5 years, i.e., one additional year beyond the bachelor degree alone. (See page 9)

The Stony Brook program is 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, contact Chemistry Education Advisor, Dr. Robert Kerber, at (631) 632-7940 or [robert.kerber@sunysb.edu](mailto:robert.kerber@sunysb.edu), or stop by the Department of Chemistry Office in Room 104 of the Graduate Chemistry Building. For advisement on education courses and training, 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 Chemistry Teacher Preparation Program Degree and Certification Requirements**

The undergraduate chemistry teacher preparation program is based on completion of a B.A. or B.S. program in Chemistry, with required classes in the supporting sciences and secondary education. The B.A. program comprises over 53 credits of chemistry, physics, and mathematics, and the B.S. program (more commonly completed by candidates) over 65 credits. Over 220 hours of laboratory work is required, as is a course in scientific writing, ethics, and use of scientific literature.

Additionally, teacher candidates take courses in biology and earth science beyond the requirements for the chemistry major.

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All applicants to the Chemistry Teacher Preparation Program must:

- Apply to the program during second semester of sophomore year or first semester of junior year.
- Have taken at least 4 science lab courses.
- Achieve a cumulative GPA of 2.75 and a GPA of 2.75 in science courses.
- Contact the chemistry education advisor for a transcript review and to plan a course of study.
- 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) and your essay and 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 Chemistry advisor’s office in the Chemistry Building, and the Science Education Program Office, Life Sciences 001.

Contact information for program advisors can be found on the first page of this document.

## Chemistry Content for Teacher Preparation Option

### A. Bachelor of Science Core Requirements

- CHE 131, 132 or 141, 142 General or Honors Chemistry
- CHE 133, 134 or 143, 144 General or Honors Chemistry Laboratory
- CHE 301, 302 Physical Chemistry I, II
- CHE 303 Solution Chemistry Laboratory
- CHE 321, and 322 or 326 Organic Chemistry
- CHE 327 Organic Chemistry Lab or CHE 383 Introductory Synthetic and Spectroscopic Laboratory Techniques
- CHE 375 Inorganic Chemistry
- CHE 385 Tools of Chemistry
- MAT 131, 132 Calculus I, II (You may substitute MAT 125, 126, 127 or 141, 142)
- MAT 211 or AMS 210 Linear Algebra
- PHY 131/ 132 Classical Physics I, II (You may substitute PHY 121/123, 122/124 or PHY 125, 126, 127)

### B. Area Requirements

One of the following options:

#### 1. Chemical Science Option

- CHE 304 Chemical Instrumentation Laboratory
- CHE 357 Molecular Structure and Spectroscopy Laboratory
- CHE 384 Intermediate Synthetic and Spectroscopic Laboratory Techniques
- CHE 487 (at least 2 credits) or CHE 496 Senior Research
- Two electives chosen from CHE 221, 344, 345, 346, 376, PHY 251, or ESG 281

#### 2. Biological Chemistry Option

- CHE 384 Intermediate Synthetic and Spectroscopic Laboratory Techniques
- One organic or inorganic chemistry elective chosen from CHE 344, 345, 346, 376, 482, or 496
- BIO 202 Fundamentals of Biology: Cell and Molecular Biology
- BIO 361 Biochemistry I
- BIO 310 Cell Biology or BIO 362 Biochemistry II

#### 3. Chemical Physics Option

- CHE 304 Chemical Instrumentation Laboratory
- CHE 351 Quantum Chemistry or CHE 353 Chemical Thermodynamics
- CHE 357 Molecular Structure and Spectroscopy Laboratory
- MAT 205 Calculus III (See note 1 for possible substitutions)
- PHY 251/252 Modern Physics and Laboratory
- One elective chosen from PHY 262, 301, 303, or 306

## Chemistry Teacher Preparation Information Pack

### 4. Environmental Chemistry Option

- CHE 304 Chemical Instrumentation Laboratory
- CHE 310 Chemistry in Technology and The Environment
- CHE 357 Molecular Structure and Spectroscopy Laboratory
- CHE 384 Intermediate Synthetic and Spectroscopic Laboratory Techniques
- BIO 201 Fundamentals of Biology: Organisms to Ecosystems  
or BIO 113 Applied Ecology
- ATM 397 Air Pollution and Its Control

### 5. Marine and Atmospheric Chemistry Option

- ATM 205 Introduction to Atmospheric Sciences
- MAR 308 Principles of Instrumental Analysis
- MAR 333 Coastal Oceanography
- MAR 351 Introduction to Ocean Chemistry
- MAR 313 Marine Biochemistry and MAR 410 Marine Geochemistry, or
- ATM 305 Global Atmospheric Change and ATM 397 Air Pollution and Its Control

## C. Upper-Division Writing Requirements

Each student majoring in chemistry must take CHE 385, Tools of Chemistry, until a satisfactory grade is achieved. The course requires several papers, which are evaluated for cogency, clarity and mechanics.

Notes:

#### 1. Alternate Mathematics sequences:

The following alternate sequences may be substituted for major requirements or prerequisites: MAT 125, 126, 127 or 141, 142 or AMS 151, 161 for MAT 131, 132; MAT 203 or 205 or AMS 210 for MAT 211. Equivalency for MAT courses as indicated by earning the appropriate score on a placement examination will be accepted as fulfillment of the requirement without the necessity of substituting other credits.

#### 2. Alternate Physics Sequences:

The following alternate sequences may be substituted by physics requirements or prerequisites: PHY 121/123 and PHY 122/124 or PHY 141, 142 or PHY 125, 126, 127 for PHY 131, 132.

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 chemistry.

## D. Required Additional Areas of Study

In addition to the mathematics and physics courses listed above for all chemistry majors, all chemistry teacher candidates are required to complete one course in biology (BIO 150 or BIO 201 or BIO 202) and one course in earth and space sciences with lab (GEO 102/112 or GEO 103/113 or AST 101/112 or ATM 102 or ATM 205).

## E. Interdisciplinary Seminar Series:

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

## F. Required Professional Studies in Education Courses

- \_\_\_ PSY 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:

- Prior to admission to student teaching, candidates will be interviewed by a committee to assess their ability to speak extemporaneously about both chemistry 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 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 placement. Before completing the program, students must not only pass the *Content Specialty Test* (CST) in chemistry, 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 advisor. The *Assessment of Teaching Skills, Written* (ATS-W) is also required prior to certification. For further information about the NYSTCE program, visit their website at <http://www.nystce.nesinc.com/>.

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

## 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 Chemistry

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). The faculty advisor for the MAT in Chemistry program is Dr. Robert Kerber, 631- 632-7940; email: [rkerber@notes.cc.sunysb.edu](mailto:rkerber@notes.cc.sunysb.edu).

Please note that all MAT students seeking chemistry teacher certification must earn the equivalent of the Stony Brook undergraduate chemistry teacher preparation program before MAT program completion. For full details, consult the degree and certification requirements for the undergraduate chemistry teacher preparation program. Students plan an appropriate course of study in collaboration with the Chemistry Education Advisor.

### A. Core Science Courses

**Science (flexible) for Master of Arts in Teaching Degree** – 15 credits, including CHE 590 (M.S. Term Paper, see below) and four graduate courses as appropriate in CHE and other science departments. There are no core requirements. Students choose from among this *illustrative* list of possible courses, or other graduate level science courses, with approval of the advisor. Additionally, the MAT in Chemistry program allows, for instance, molecular biology courses dependent on student background. Consult Graduate Course Catalog for listing of other courses.

- \_\_\_\_\_ CHE 501 Instrumental Methods in Chemistry
- \_\_\_\_\_ CHE 502 Mechanistic Organic Chemistry
- \_\_\_\_\_ CHE 503 Synthetic Organic Chemistry
- \_\_\_\_\_ CHE 504 Structure and Reactivity in Organic Chemistry
- \_\_\_\_\_ CHE 507 Biomolecular Structure and Reactivity
- \_\_\_\_\_ CHE 511 Structural Inorganic Chemistry
- \_\_\_\_\_ CHE 514 Transition Metal Chemistry
- \_\_\_\_\_ CHE 515 Advanced Inorganic Chemistry
- \_\_\_\_\_ CHE 521 Quantum Chemistry 1
- \_\_\_\_\_ CHE 522 Molecular Spectroscopy
- \_\_\_\_\_ CHE 523 Chemical Thermodynamics
- \_\_\_\_\_ CHE 524 Magnetic Resonance
- \_\_\_\_\_ CHE 525 Theoretical Chemistry
- \_\_\_\_\_ CHE 528 Statistical Mechanics
- \_\_\_\_\_ CHE 530 Physical Chemistry of Macromolecules
- \_\_\_\_\_ CHE 589 Directed Study
- \_\_\_\_\_ CHE 593 Chemical Demonstrations
- \_\_\_\_\_ CHE 610/611 – Practicum in Teaching

## Chemistry Teacher Preparation Information Pack

The M.S. Term Paper is a substantial paper on some aspect of chemical science, technology, or pedagogy is to be prepared under the aegis of CHE 590. The subject should be chosen in consultation with the faculty advisor, in whose section of CHE 590 the student will register. The paper will be evaluated by a committee of two or more faculty appointed by the Graduate Coordinator. A copy of the paper in its final form is to be submitted to the chemistry library for archiving.

### **B. Required Additional Areas of Study**

All Masters candidates seeking chemistry teacher certification must earn the equivalent of the Stony Brook undergraduate chemistry teacher preparation program. Therefore, consult the undergraduate program described above. Please note that in addition to the mathematics and physics courses required for all chemistry majors, all chemistry teacher candidates are required to complete one course in biology and one course in earth and space sciences.

NOTE: To qualify for the General Science (7-12) certification, candidates must complete a minimum of 18 semester hours (undergraduate or graduate) in two or more sciences other than chemistry.

### **C. Interdisciplinary Seminar Series**

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

### **D. 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 Introduction to Science Teaching (Methods of Teaching 1)  
\_\_\_ SCI 549 Field Experience I (co-requisite SCI 510)  
\_\_\_ SCI 520 Science Instructional Strategies & Techniques (Methods of Teaching 2)  
\_\_\_ SCI 550 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 chemistry 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. Depending on the semester and public school vacation schedules, student teaching may extend beyond the university semester calendar. Student teaching is divided into two placement of approximately equal duration, one in a middle school/junior high school and the other in a high school.

### **E. 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.

### **F. 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 placement. Before completing the program, students must not only pass the *Content Specialty Test* (CST) in chemistry, 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 advisor. The *Assessment of Teaching Skills, Written* (ATS-W) is also required prior to certification. For further information about the NYSTCE program, visit their website at <http://www.nystce.nesinc.com/> .

All students must be fingerprinted while enrolled in SCI 510, and complete three mandated seminars, *Training in Child Abuse Recognition*, *Substance Abuse Education*, and *School Violence and Intervention*, prior to student teaching.

For details see <http://www.sunysb.edu/spd/career/tworkshops.html>

### **G. Language Requirement**

New York State certification requires at least six credits of college level study of a foreign language.

### **H. 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 Master's essay.

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

The BS/MAT Chemistry teacher preparation program is based on completion of a combined BS in Chemistry and Master of Arts in Teaching in Chemistry. 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 are required for each of the individual degree programs. A complete description follows below.

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

- Have taken at least 4 science lab courses.
- Contact the chemistry education advisor for a transcript review and to plan a course of study.
- Achieve a cumulative GPA of 3.00 and a GPA of 3.00 in science courses.
- Apply for the combined program by the end of the junior year.
- 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
  - Any additional items required by the School of Professional Development
- Submit application prior to SPD deadline (for Fall admission: March 31; for Spring admission: October 31).

### **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 Chemistry.

Chemistry Teacher Preparation Information Pack

Chemistry BS/MAT – Sample Course Sequence

	UG	G		UG	G
<b>Semester 1</b>			<b>Semester 6</b>		
CHE 131 or 141	4		CHE 302	4	
CHE 133 or 143	1		CHE 304	2	
MAT 125	3		DEC	3	
SBU 101	1		PHY 132, 134	4	
DEC	3		SSE 350	3	
DEC	3		<b>Semester 7</b>		
<b>Semester 2</b>			CHE 375	3	
CHE 132 or 142	4		CHE 357	2	
CHE 134 or 144	1		CHE 310	3	
MAT 126	3		CHE 495	3	
BIO or GEO	3		DEC	3	
DEC	3		Grad 1		3
DEC	3		<b>Semester 8</b>		
<b>Semester 3</b>			SCI 510		3
CHE 321	3		SCI 549		1
CHE 383	2		LIN 544		3
MAT 127	3		CHE 496	3	
GEO or BIO	3		Grad 2		3
DEC	3		DEC	3	
DEC	3		<b>Semester 9</b>		
<b>Semester 4</b>			SCI 520		3
CHE 322 or 326	3		SCI 550		1
CHE 384	3		Grad 3		3
CHE 385	1		Grad 4		3
MAT 211 or AMS 210	3		CHE 590**		3
DEC	3		<b>Semester 10</b>		
DEC	3		SCI551		3
<b>Semester 5</b>			SCI552		3
CHE 301	4		SCI554		3
CHE 303	2				
PHY 131, 133	4				
PSY 327	3				
*Foreign Lang.	4				

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

\*\*A substantial paper on some aspect of chemical science, technology, or pedagogy is to be prepared under the aegis of CHE 590. The subject should be chosen in consultation with the faculty advisor, in whose section of CHE 590 the student will register. The paper will be evaluated by a committee of two or more faculty appointed by the Graduate Coordinator. A copy of the paper in its final form is to be submitted to the chemistry library for archiving.

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 chemistry teacher preparation advisor may lead to delay in completion of the program. A student wishing to complete this 5 year combined program is strongly encouraged to consult with the chemistry teacher preparation advisor for individualized guidance in course selection.

NOTE: 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 chemistry.

## **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 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.

### **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 placement. Before completing the program, students must not only pass the *Content Specialty Test* (CST) in chemistry, 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 advisor. The *Assessment of Teaching Skills, Written* (ATS-W) is also required prior to certification. For further information about the NYSTCE program, visit their website at <http://www.nystce.nesinc.com/>.

All students must be fingerprinted during SCI 410/510 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.)

### **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.