



Stony Brook University

Becoming an Earth Science 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 earth and space sciences in secondary schools, grades 7 – 12.

The **undergraduate** route to certification requires completion of a Bachelor of Arts in Earth and Space Sciences/Earth Science Education track or a double major of a Bachelor of Arts in Earth and Space Sciences/Earth Science Education track with a Bachelor of Science in Atmospheric and Oceanic Sciences, Astronomy/Planetary Sciences or Geosciences 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 Bachelor of Arts degree in Earth and Space Sciences/Earth Science Education track. (See page 5)

The **combined** route to certification in which students obtain both the Bachelor of Arts in Earth and Space Sciences/Earth Science Education track and Master of Arts in Teaching degrees in 5 years, i.e., one additional year beyond the bachelor degree alone. (See page 10) A double major with a BA in ESS and BA or BS in another major is not possible in this route.

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 Earth Science Education Advisor, Dr. Gilbert Hanson, at (631) 632-8210 or gilbert.hanson@sunysb.edu. For advisement on education courses contact Keith Sheppard, Director of the Science Education Program, at (631) 632-2989 (Keith.Sheppard@stonybrook.edu) or Linda Padwa, at (631) 632-7075 (Linda.Padwa@stonybrook.edu)

Earth Science Education at Stony Brook University

BA Earth Science Education

The Earth Science Education Program offers undergraduate science education courses satisfying New York State requirements for provisional certification as a secondary school teacher of earth science and general science. The program is designed to be taken sequentially in the last three or four semesters of your degree program. All undergraduate earth science education candidates must major in the Earth and Space Sciences/Earth Science Education Track.

Students with majors in Atmospheric and Oceanic Sciences, Astronomy/Planetary Sciences and Geosciences who intend to enter the Earth Science Education Program must declare a double major with the Earth and Space Sciences/Earth Science Education Track and meet the requirements of both majors.

All applicants 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.
- Achieve a cumulative GPA of 3.0 and a GPA of 3.0 in science courses.
- Contact the Earth Science 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) from each college or university attend, 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 Earth and Space Sciences advisor’s office in the ESS Building, and the Science Education Program Office, Life Sciences 061.

The Earth Science Education advisor is Gilbert N. Hanson, telephone 631-632-8210, e-mail gilbert.hanson@sunysb.edu

The Science Education advisors are Keith Sheppard and Linda Padwa. Contact information can be found on the first page of this document.

Science Course Requirements for the Earth Science Education Track: (effective 2009)

A. Introductory Science Courses

AMS 102 Elements of Statistics
AST 101 Introduction to Astronomy and AST 112 Astronomy Laboratory
ATM 102 Weather and Climate
ATM 205 Introduction to Atmospheric Sciences
BIO 201 Fundamentals of Biology: Organisms to Ecosystems
BIO 202 Fundamentals of Biology
BIO 204 Fundamental of Scientific Inquiry
CHE 131, 132 General Chemistry I and II (see note #2)
CHE 133, 134 General Chemistry Laboratory I and II
GEO 102 The Earth and GEO 112 Physical Geology
GEO 103 The Earth Through Time and GEO 113 Historical Geology Laboratory
MAT 125 Calculus A
PHY 119 Physics for Environmental Studies OR PHY 121/123 Physics for Life Sciences with Lab

B. Elective Courses

At least 24 credits should be selected from an approved course list chosen in consultation with the program director: See http://www.geo.sunysb.edu/Earth_Science_Education/ba-science.htm
At least two of the courses must include a laboratory.

C. Specific Science Concentration

At least 12 credits of the 24 elective credits must be chosen from one of the earth and space science disciplines: astronomy, atmospheric sciences or geosciences.

D. Upper-division Writing Requirement

All students in the earth science education track must submit two papers (term papers, laboratory reports, or independent research reports) that involve collecting data or observations, processing and interpreting this information and preparing a professional quality report. These reports must be submitted to the director of undergraduate studies for evaluation by the end of the junior year. If this evaluation is satisfactory, the student will have fulfilled the upper-division writing requirement. If it is not, the student must fulfill the requirement before graduation.

Notes:

1. See the Education and Teacher Certification entry in the alphabetical listing of Approved Majors, Minors and Programs for additional information on requirements for earth science secondary teacher education program.
2. The sequence CHE 129 and 130 may be substituted for CHE 131, with permission of the undergraduate program director.

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 the earth sciences.

Education Course Requirements

A. Required Professional Studies in Education Courses

- PSY 327 Middle Childhood/Adolescent Development
- 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 the ability to speak extemporaneously about both earth science 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.

B. 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.

C. State Tests, Mandated Seminars and Fingerprinting

- All teacher candidates must be fingerprinted during SCI 410.
- Prior to student teaching, candidates must complete five mandated seminars, *Training in Child Abuse Recognition, Substance Abuse Education, School Violence and Intervention*, and

Dignity for All Students (DASA). For details and to register for the seminars on campus, see <http://www.sunysb.edu/spd/career/tworkshops.html>.

New York State examinations required for teacher certification are:

- Educating All Students Test (EAS)
- Content Specialty Test (CST) in Earth Science [Note: 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.]
- Teacher Performance Assessment (edTPA) - This is a portfolio assessment that is prepared during the student teaching semester.
- For further information about the NYSTCE testing program, visit their website at <http://www.nystce.nesinc.com/>.

It is recommended that candidates take the EAS upon completion of CEF 347 and LIN 344, and take the CST upon completion of Earth Science courses required for the major. The edTPA will be completed during student teaching.

D. Language Requirement

New York State certification requires six credits of college level study of a foreign language. Satisfaction of SBU's DEC Entry Skill 3/SBC LANG fulfills the foreign language requirement.

E. 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 Earth Science

The Master of Arts in Teaching (MAT) Earth Science program prepares students with undergraduate majors in science to earn an MAT and to assume teaching positions in grades 7-12. The program is committed to both science teaching and science learning.

The MAT Earth Science program is specifically registered and approved by the State Education Department as a teacher preparation program. Persons completing this program are eligible for "approved program" certification through the Campus Teacher Certification Office located in the School of Professional Development (www.sunysb.edu/spd/graduate/matscience.html)

You should first consult with the MAT Earth Science Education advisor to determine if you should proceed with the application process. Earth Science Education Advisor is: Dr. Gilbert N. Hanson, email address: gilbert.hanson@sunysb.edu, phone: 631-632-8210

Admission to MAT Earth Science Education Program

Requirements

You are expected to have completed the equivalent of an academic major in a science with a minimum GPA of 3.0 in your overall bachelor's degree program and a minimum GPA of 3.00 in science studies. You must also demonstrate, through your application and letters of reference, that you possess the temperament and disposition to be an effective teacher. Most applicants will have little or no previous course work in education or formal classroom teaching experience.

You must submit or have sent to the School of Professional Development

- Completed MAT application with a nonrefundable application fee
- Three letters of recommendation, preferably from faculty who know you well
- Official copies of all previous college transcripts
- GRE – General Exam
- Any additional items required by the School of Professional Development

Time to Complete Studies

The MAT program in Earth Science can often be completed in three semesters of full-time study, but it is somewhat longer for the part-time student.

Additional Information

- The earth science education advisor, Dr. Gilbert N. Hanson, provides information about the science requirements. Email: gilbert.hanson@sunysb.edu; phone: 631-632-8210.
- The Science Education Program provides information about science education courses. See the Professional Education Program web site, www.pep.sunysb.edu, or contact the Science Education Assistant Director, Linda Padwa, at 631-632-7075;
- Assistant Dean Marvin Glockner provides information about the application procedures, School of Professional Studies, SUNY at Stony Brook, Stony Brook, NY 11794-4310 (email: Marvin.Glockner@stonybrook.edu; phone: 631-632-7055)

Science Course Requirements

These minimum introductory and graduate or advanced undergraduate science course requirements must be met before you begin student teaching.

A. Introductory Science Courses

The following courses or their equivalents at other colleges or universities are required.

- AMS 102 Elements of Statistics
- AST 101 Introduction to Astronomy and AST 112 Astronomy Laboratory
- ATM 102 Weather and Climate
- ATM 205 Introduction to Atmospheric Sciences
- BIO 201 Fundamentals of Biology: Organisms to Ecosystems
- BIO 202 Fundamentals of Biology
- BIO 204 Fundamental of Scientific Inquiry
- CHE 131, 132. General Chemistry I and II (see note #2)
- CHE 133, 134 General Chemistry Laboratory I and II
- GEO 102 The Earth and GEO 112 Physical Geology
- GEO 103 The Earth Through Time and GEO 113 Historical Geology Laboratory
- MAT 125 Calculus A

- PHY 119 Physics for Environmental Studies OR PHY 121/123 Physics for Life Sciences with Lab OR PHY 125 Classical Physics A plus PHY 133 Classical Physics Laboratory I OR PHY 131 Classical Physics I plus PHY 133 Classical Physics Laboratory I

B. Graduate or Advanced Undergraduate Science Courses 24 credits total

Advanced courses are those with a pre-requisite of introductory courses or a sequence of introductory courses. For example, an advanced course in chemistry may require CHE 131 and CHE 132 as prerequisites. However, CHE 132, which requires CHE 131, is not an advanced course. At Stony Brook most advanced courses are numbered 300 or higher.

At least 12 Credits within Earth Sciences: that is, astronomy, atmospheric sciences, and geology. Some marine science courses with an earth science theme are also acceptable. Graduate atmospheric science courses have an MAR designator.

At least 12 credits in one scientific discipline; acceptable disciplines are geology, astronomy, atmospheric science, physics, chemistry, biology, physical geography, or environmental science.

See the advisement page for additional details of typical prerequisite courses:
http://www.geo.sunysb.edu/Earth_Science_Education/mat-requirements.htm]

Approved Earth Science Courses

Students will be required to complete 15 credits of approved graduate earth science courses and a research project or projects approved by the sponsoring department. Graduate earth science courses taken as part of the MAT Earth Science curriculum can be used to meet the minimum requirements to student teach in earth science.

A list of appropriate earth science courses can be found in the next section. These courses can also be used to meet the graduate or advanced undergraduate science course requirements.

At least one of the graduate courses requires a research report that involves selecting or collecting data or observations, processing and interpreting this information and presenting it in a professional style. A report that consists of a literature review is not acceptable to meet this requirement. The research projects are generally associated with the science courses required for this degree. The student must arrange with the instructor and the MAT Earth Science Education advisor before the semester starts, or at the beginning of the semester, about the requirements for these projects.

The graduate academic programs at SUNY Stony Brook for earth science teachers have been designed to provide the education necessary for teaching the Earth Science Curriculum in New York State. In order to teach the curriculum it is essential that teachers have college level courses in atmospheric science, astronomy, geoscience and marine science. About 60% of the Earth Science Curriculum is geoscience, about 20% is atmospheric science, 20% is astronomy.

It is highly recommended that a student preparing for a career as an earth science teacher become familiar with the curriculum and the contents of the New York State Regents Exams in Earth Sciences. Examples of Regent Exam Questions as well as Earth Science Reference Tables can be found at the State Education Department web site, www.emsc.nysed.gov/ciai/assess.html.

Copies of Regents Exams are available on-line at the New York State Education Department web site, <http://www.nysedregents.org/>.

Courses are selected with the approval of the earth science advisor. The selection should include recognition of the minimum course requirements for student teaching above. The approved graduate courses for the MAT include the following.

ESS 522 The Planets*
ESS 523 Collisions in the Solar System*
ESS 524 The Universe*
ESS 532 Atmospheric Fundamentals*
ESS 533 Global Climate*
ESS 534 Air Pollution and Control*
ESS 536 Principles of Weather Analysis and Forecasting*
ESS 541 Earth's Surficial Environment*
ESS 542 Tectonic Environment*
ESS 543 Rocks and Minerals*
ESS 544 Geology of New York*
ESS 585 Directed Studies
ESS 589 Research for Earth Science Teachers (1 to 3 credits)
ESS 601 Topics in Earth and Space Sciences
GEO 510 Dimensions of Global Change*
GEO513 GIS Fundamentals I*
GEO 530 The Geology of Mars*
GEO 533 Geochemistry of the Terrestrial Planets*
GEO 535 Regional Structure and Tectonics*
GEO 543 Stratigraphy*
GEO 547 Remote Sensing in Geosciences*
GEO 549 Structural Geology*
GEO 567 Sedimentary Rocks and Crustal Evolution*
GEO 585 Directed Studies
GEO 588 Geological Field Methods for Earth Science Teachers*
MAR 506 Geological Oceanography
MAR 527 Global Change
MAR 564 Atmospheric Structure and Analysis *
MAR 565 Global Atmospheric Change *
MAR 566 Air Pollution and Its Control
MAR 596 Principles of Atmospheric Chemistry
* (Science research project required as part of course. A lesson plan *in lieu* of a research project is not acceptable.)

Science Education Courses

The following education courses are required:

Professional Studies in Education 21 credits

- 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 Pedagogy and Methods in Science Education I
- SCI 520 Pedagogy and Methods in Science Education II
- SCI 549 Field Experience I
- SCI 550 Field Experience II

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.

Supervised Student Teaching 9 credits

- SCI 551 Supervised Student Teaching High School Grades 10-12 (co requisite SCI 552 & SCI 554) (*See below)
- SCI 552 Supervised Student Teaching Middle School Grades 7-9 (co requisite SCI 551 & SCI 554) (*See below)
- SCI 554 Student Teaching Seminar (co requisite SCI 551 & SCI 552) (*See below)

*** Notes:**

1) Prior to admission to student teaching, candidates will be interviewed by a committee to assess the ability to speak extemporaneously about both earth science 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.

2) 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.

C. State Tests, Mandated Seminars and Fingerprinting

- All teacher candidates must be fingerprinted during SCI 510.
- Prior to student teaching, candidates must complete five mandated seminars, *Training in Child Abuse Recognition, Substance Abuse Education, School Violence and Intervention, and Dignity for All Students* (DASA). For details and to register for the seminars on campus, see <http://www.sunysb.edu/spd/career/tworkshops.html>.

New York State examinations required for teacher certification are:

- Educating All Students Test (EAS)
- Content Specialty Test (CST) in Earth Science [Note: 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.]
- Teacher Performance Assessment (edTPA) - This is a portfolio assessment that is prepared during the student teaching semester.
 - For further information about the NYSTCE testing program, visit their website at <http://www.nystce.nesinc.com/>.

It is recommended that candidates take the EAS upon completion of CEF 547 and LIN 544, and take the CST during SCI 510. The edTPA will be completed during the SCI 554 semester.

D. Language Requirement:

New York State certification requires 6 credits of a foreign language or its equivalent. (Satisfaction of SBU's DEC Entry Skill 3/SBC LANG fulfills this requirement.) Bilingual students may satisfy this requirement by taking the CLEP exam in foreign language. (http://www.collegeboard.com/student/testing/clep/ex_foreign.html)

E. 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.

F. 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).

G. General Science Certification

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

Five-Year BA/MAT Earth Science Teacher Preparation Program Degree and Certification Requirements

The requirements for the combined BA/MAT program in Earth Science Education are identical to the requirements for the two programs separately. Time is saved by allowing some courses in content and pedagogy to count for both degrees.

Applicants to the BA/MAT Earth Science Teacher Preparation Program must:

- Have taken at least 4 science lab courses.
- Contact the earth science 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 junior year.
- Complete the BA/MAT application that is found on the School of Professional Development web site (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 as indicated on the SPD website:
www.stonybrook.edu/spd

NOTE: 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 Earth Science advisor’s office in the Earth Sciences Building, and the Science Education Program Office, Life Sciences 061.

Undergraduate and Graduate elective credits required

Undergraduate: 45 credits of DEC/SBC and free electives and 12 Credits of advanced Earth Science courses to be chosen in consultation with the Earth Science Education advisor.

Graduate: 15 Credits of Earth Science Courses to be chosen in consultation with the Earth Science Education advisor.

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

Students should apply to the combined BA/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.

Students must maintain a B average in their graduate courses. Students who are unable to maintain this average will be encouraged, while in Semester 8 of their studies, to leave the program and graduate with a BA degree in Earth and Space Science.

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 BA in Earth and Space Sciences.

Additional program requirements

Undergraduate Upper-division writing requirement:

All students in the earth science education track must submit two papers (term papers, laboratory reports, or independent research reports) that involve collecting data or observations, processing and interpreting this information and preparing a professional quality report.

Graduate writing requirement:

At least one of the graduate courses must require a research report that involves selecting or collecting data or observations, processing and interpreting this information and presenting it in a professional style. A report that consists of a literature review will not meet this requirement.

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.

Prior to admission to Student Teaching:

The candidate will be interviewed by a committee consisting of the content advisor, a member of the science education faculty, and the student teaching field supervisor. The purpose of this interview is to assess the candidate's ability to speak extemporaneously about subject matter 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 be blocked from student teaching.

State Tests, Mandated Seminars and Fingerprinting:

- All teacher candidates must be fingerprinted during SCI 510.
- Prior to student teaching, candidates must complete five mandated seminars, *Training in Child Abuse Recognition*, *Substance Abuse Education*, *School Violence and Intervention*, and *Dignity for All Students* (DASA). For details and to register for the seminars on campus, see <http://www.sunysb.edu/spd/career/tworkshops.html>.

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- Teacher Performance Assessment (edTPA) - This is a portfolio assessment that is prepared during the student teaching semester.
- For further information about the NYSTCE testing program, visit their website at <http://www.nystce.nesinc.com/>.

It is recommended that candidates take the EAS upon completion of CEF 347/547 and LIN 344/544, and take the CST during SCI 510. The edTPA will be completed during student teaching.

Language Requirement:

New York State certification requires at least six credits of college level study of a foreign language. Satisfaction of SBU's DEC Entry Skill 3/SBC LANG fulfills the foreign language requirement.

Professional Portfolio:

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

General Science Certification:

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 the earth sciences.

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).

Science Course Requirements

These minimum introductory and graduate or advanced undergraduate science course requirements must be met before you begin student teaching.

A. Introductory Science Courses

The following courses or their equivalents at other colleges or universities are required.

- AMS 102 Elements of Statistics
- AST 101 Introduction to Astronomy and AST 112 Astronomy Laboratory
- ATM 102 Weather and Climate
- ATM 205 Introduction to Atmospheric Sciences
- BIO 201 Fundamentals of Biology: Organisms to Ecosystems
- BIO 202 Fundamentals of Biology
- BIO 204 Fundamental of Scientific Inquiry
- CHE 131, 132. General Chemistry I and II (see note #2)
- CHE 133, 134 General Chemistry Laboratory I and II
- GEO 102 The Earth and GEO 112 Physical Geology
- GEO 103 The Earth Through Time and GEO 113 Historical Geology Laboratory
- MAT 125 Calculus A
- PHY 119 Physics for Environmental Studies OR PHY 121/123 Physics for Life Sciences with Lab OR PHY 125 Classical Physics A plus PHY 133 Classical Physics Laboratory I OR PHY 131 Classical Physics I plus PHY 133 Classical Physics Laboratory I

B. Graduate or Advanced Undergraduate Science Courses 27 credits

Advanced courses are those with a pre-requisite of introductory courses or a sequence of introductory courses. For example, an advanced course in chemistry may require CHE 131 and CHE 132 as prerequisites. However, CHE 132, which requires CHE 131, is not an advanced course. At Stony Brook most advanced courses are numbered 300 or higher.

At least 15 Credits within Earth Sciences: that is, astronomy, atmospheric sciences, and geology. Some marine science courses with an earth science theme are also acceptable. Graduate atmospheric science courses have an MAR designator.

At least 12 credits in one scientific discipline; acceptable disciplines are geology, astronomy, atmospheric science, physics, chemistry, biology, physical geography, or environmental science.

Courses are selected with the approval of the earth science advisor. The selection should include recognition of the minimum course requirements for student teaching above. The approved graduate courses for the MAT include the following:

ESS 522 The Planets*
ESS 523 Collisions in the Solar System*
ESS 524 The Universe*
ESS 532 Atmospheric Fundamentals*
ESS 533 Global Climate*
ESS 534 Air Pollution and Control*
ESS 536 Principles of Weather Analysis and Forecasting*
ESS 541 Earth's Surficial Environment*
ESS 542 Tectonic Environment*
ESS 543 Rocks and Minerals*
ESS 544 Geology of New York*
ESS 585 Directed Studies
ESS 589 Research for Earth Science Teachers (1 to 3 credits)
ESS 601 Topics in Earth and Space Sciences
GEO 510 Dimensions of Global Change*
GEO513 GIS Fundamentals I*
GEO 530 The Geology of Mars*
GEO 533 Geochemistry of the Terrestrial Planets*
GEO 535 Regional Structure and Tectonics*
GEO 543 Stratigraphy*
GEO 547 Remote Sensing in Geosciences*
GEO 549 Structural Geology*
GEO 567 Sedimentary Rocks and Crustal Evolution*
GEO 585 Directed Studies
GEO 588 Geological Field Methods for Earth Science Teachers*
MAR 506 Geological Oceanography
MAR 527 Global Change
MAR 564 Atmospheric Structure and Analysis *
MAR 565 Global Atmospheric Change *
MAR 566 Air Pollution and Its Control
MAR 596 Principles of Atmospheric Chemistry
* (Science research project required as part of course. A lesson plan *in lieu* of a research project is not acceptable.

A student wishing to complete this 5 year combined program is strongly encouraged to consult with the earth science teacher preparation advisor for individualized guidance in course selection. For approved graduate Earth Science courses see:
http://www.geo.sunysb.edu/Earth_Science_Education/mat-science.htm

Sample Course Sequence for Combined BA-MAT Program

	UG	G		UG	G
Semester 1			Semester 6		
DEC/SBC	3		DEC/SBC	3	
CHE 131	4		UG Earth Science	4	
CHE 133	1		Upper Division DEC/SBC	3	
GEO 102	3		Upper Division Elec.	3	
GEO112	1		Upper Division Elec.	3	
MAT 125	3		Semester 7		
Semester 2			DEC/SBC	3	
DEC/SBC	3		DEC/SBC	3	
BIO 201 or BIO 202	3		UG Earth Science	4	
CHE 132	4		PSY 327	3	
CHE 134	1		LIN 344	3	
GEO 103	3		Semester 8		
GEO113	1		DEC	3	
Semester 3			Grad Earth Science		3
DEC/SBC	3		Grad Earth Science		3
DEC/SBC	3		Grad Earth Science		3
PHY 119	4		SCI 510		3
AMS 102	3		SCI 549		1
BIO 202 or BIO 201	3		Semester 9		
BIO 204	2		CEE 505		3
Semester 4			Grad Earth Science		3
DEC/SBC	3		Grad Earth Science		3
DEC/SBC	3		SCI 520		3
AST 101	3		SCI 550		1
AST 112	1		CEF 547		3
ATM 102	3		Semester 10		
UG Earth Science	4		SCI551		3
Semester 5			SCI552		3
ATM 205	3		SCI554		3
UG Earth Science	4				
Upper Division DEC/SBC	3				
Upper Division Elec.	3				
Upper Division Elec.	3				

The above listing of courses provides a *suggested* sequence for coursework. There is a degree of flexibility in the order of courses so the earth science teacher preparation advisor should be consulted when planning a course sequence.