

Name of Institution
Lander University

Name of Program (include concentrations, options, and tracks)
B.S., Chemistry, Secondary Education concentration

Program Designation

- Associate's Degree Master's Degree
 Bachelor's Degree: 4 Year Specialist
 Bachelor's Degree: 5 Year Doctoral Degree: Research/Scholarship (e.g., Ph.D. and DMA)
 Doctoral Degree: Professional Practice (e.g., Ed.D., D.N.P., J.D., Pharm.D., and M.D.)

Does the program qualify for supplemental Palmetto Fellows and LIFE Scholarship awards?

- Yes
 No

Proposed Date of Implementation
Fall 2016 (assuming approval from the S.C.
Department of Education for Certification Authority by
this time)

CIP Code
131205

Delivery Site(s)
Lander University Main Campus (Site Code: 50401)

Delivery Mode

- Traditional/face-to-face*
*select if less than 50% online
- Distance Education
 100% online
 Blended (more than 50% online)
 Other distance education

Program Contact Information (name, title, telephone number, and email address)

- Dr. Ralph C. Layland, Chair of the Department of Physical Sciences, Professor of Chemistry, 864.388.8407, rlayland@lander.edu.
- Dr. David A. Slimmer, Dean of the College of Science and Mathematics, Professor of Physics, 864.388.8381, dslimmer@lander.edu.

Institutional Approvals and Dates of Approval

- Dr. Ralph C. Layland, Chair of the Department of Physical Sciences: December 1, 2014
- Dr. David A. Slimmer, Dean of the College of Science and Mathematics: December 9, 2014
- Dr. S. David Mash, Provost and Vice President for Academic Affairs: December 11, 2014
- Dr. Richard E. Cosentino, President: July 30, 2015
- Board of Trustees: (March 2016)

Background Information

State the nature and purpose of the proposed program, including target audience and centrality to institutional mission. (1500 characters)

This major is designed for those interested in teaching chemistry at the secondary level; this is not a program for individuals who want to work as chemists. While we have offered a solid chemistry program for a number of years, our graduates have not been properly prepared for teaching chemistry as they took no education or science methods courses. The objective is to allow those students interested in developing a strong understanding of both chemical principles and teaching pedagogy to prepare for teaching when they complete the program.

List the program objectives. (2000 characters)

This program will combine our strength in chemistry content education with classical education courses. Students will learn chemical principles as well as classroom management. This will prepare our students to successfully gain certification in secondary chemical education.

This program will uniquely prepare our students by allowing them to learn chemical principles from practitioners - namely, the scientists on the Lander Faculty. They will learn education principles from Lander University's College of Education faculty who are leaders in their field. This is not another program where practitioners of one field attempt to teach the basics of another. The Chemical Education major allows students to flourish in the interdisciplinary nature of the program.

Students will receive a strong, scientific foundation in a variety of courses. While the focus is on chemistry, students will be able to thrive when they begin to introduce other fields of study into their classroom, or when they begin to extend their own horizons and skills over the course of their career.

Assessment of Need

Provide an assessment of the need for the program for the institution, the state, the region, and beyond, if applicable. (1500 characters)

STEM education is essential as science and technology continue to develop. Our local school district has just added additional science courses and plans to hire at least one new instructor in District 50. In December 2015, the Department of Teacher Education received four requests for middle school science teachers in Greenwood County schools. The same trend is taking place across the state and across the country. In December, a www.monster.com search for "Chemistry Teacher" positions yielded over 50 viable positions (as many as 62 were identified, but not all were relevant to the proposed major). This need for Chemistry teachers is also demonstrated by South Carolina's loan forgiveness program for students that choose to teach in high needs schools and shortage subjects.

Presently, Lander University has the science and the education courses necessary for teacher certification in Chemistry, but no track for students to actually pursue that certification. The necessary coursework is in place for certification programs in Math and History so students enrolled in the proposed program will take many of the same courses that these students take.

Employment Opportunities

Is specific employment/workforce data available to support the proposed program?

Yes

No

If yes, complete the table and the component that follows the table on page 4. If no, complete the single narrative response component on page 5 beginning with “Provide supporting evidence.”

Employment Opportunities			
Occupation	Expected Number of Jobs	Employment Projection	Data Source
High School Teachers	+52,900	+6%	Bureau of Labor Statistics
Education, Training, and Library Occupations	+96,983	+11%	Bureau of Labor Statistics
Science Teachers in SC, Middle School	1390.57		Center for Educator Recruitment, Retention, and Advancement
Science Teacher in SC, High School	1635.8		Center for Educator Recruitment, Retention, and Advancement

Provide additional information regarding anticipated employment opportunities for graduates. (1000 characters)

Job search engines (monster.com, indeed.com) yield hundreds of job opportunities for high school chemistry teachers, further supporting the claim that the need for chemistry teachers is present in the job market today. A monster.com search for “Chemistry Teacher” positions on December 13, 2015 yielded over 50 viable positions (as many as 62 were identified, but not all were relevant to the proposed major). The Center for Educator Recruitment, Retention, and Advancement (CERRA) reports that of the 3026.37 teaching positions budgeted for in secondary science in South Carolina, 27.5 were vacant at the start of the 2014-2015 academic year; 17.5 of those were at the middle school level. Only 434.3 FTEs were filled by newly hired teachers that same year. The data for the 2015-2016 academic year has not yet been released, but it is likely that STEM areas will continue to be high-need areas in South Carolina. Lander has received four requests for Middle School science teachers in Greenwood Country in December 2015 alone. This means that there is a demonstrated need not only for STEM teachers in South Carolina, but directly in the county Lander University serves and from which Lander sources the majority of its students.

Provide supporting evidence of anticipated employment opportunities for graduates, including a statement that clearly articulates what the program prepares graduates to do, any documented citations that suggests a correlation between this program and future employment, and other relevant information. Please cite specific resources, as appropriate. (3000 characters)

Note: Only complete this if the Employment Opportunities table and the section that follows the table on page 4 have not previously been completed.

Will the proposed program impact any existing degree programs and services at the institution (e.g., course offerings or enrollment)?

Yes

No

If yes, explain. (500 characters)

Since all but one course in the new program are current Lander University courses, there would be an increase in enrollment in those course sections. Likewise, since this would be a new opportunity for students at Lander, there is expectation that some students would now enroll at Lander University who would have otherwise gone to another institution. This will also provide new opportunities to students that cannot travel outside of the Greenwood area to pursue certification.

List of Similar Programs in South Carolina

Program Name	Institution	Similarities	Differences
B.A. in Chemistry Secondary Chemistry	The Citadel	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> Requires biochemistry, physical chemistry II, and research I & II; these are elective options in our proposed program Citadel requires two biology courses, Lander would require one
B.A., Science Teaching, Chemistry	Clemson University	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> The same major can be tailored for either biology or chemistry teachers Calculus-based Physics requirement at Clemson; Algebra-based Physics requirement at Lander Astrophysics requirement at Clemson Laboratory Teaching techniques course in addition to a lecture-based methods course at Lander
B.A., Chemistry, Teacher Education	Coker College	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> Requires organic chemistry II, biochemistry, research, physical chemistry II, advanced inorganic chemistry; these are elective options in our proposed program Coker requires 126 credit hours, we would require only 122
B.S., Secondary Education with Chemistry	College of Charleston	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> Only part of the Education Department, not the Chemistry department, at College of Charleston
B.A. in Chemistry, Minor in Education	Converse College	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> Requires organic chemistry II, junior and senior seminar in chemistry; these are elective options in our proposed program Converse has no geology, biology, or physical science requirements; Lander would require one biology course and offer geology and physical science electives Converse requires 30hr of education courses; the proposed program will require 37 hours in education coursework.

B.A., B.S., Chemistry major, Education minor	Erskine College	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> Requires service learning, quantum physics, electronics, new/old testament courses, and calculus III & IV; these would not be required in the proposed program Requires biochemistry, inorganic chemistry, physical chemistry II; these are elective options in the proposed program
B.S., Chemistry major, plus completion of Secondary Certification in Chemistry program	Furman University	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> Requires completion of the chemistry major, and then additional graduate coursework to complete secondary certification program; Furman does not offer a single comprehensive major as is proposed for Lander University Teaching internship required after graduation from Furman; this would be completed as part of the senior year coursework at Lander
B.S., Chemistry, Secondary Certification concentration	Newberry College	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> Requires biochemistry, environmental chemistry, inorganic chemistry at Newberry; these are elective options in the proposed program Requires an inquiry course (Investigative Chemistry); Lander offers undergraduate research as an elective
B.S., Middle Level Education – Science Track	South Carolina State University	Students prepare for teacher certification	<ul style="list-style-type: none"> Students choose to focus on sciences (biology, physics, and earth sciences – NOT chemistry) in addition to one other area of study. This program prepares middle school teachers and tutors
B.S.Ed., Secondary Education -- Chemistry	USC = Aiken	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> Program is housed in the Education Department; the proposed program would reside in the Physical Sciences department Requires biochemistry, organic chemistry II, inorganic chemistry, physics II, a research chemistry course and a research experience. These courses would be offered as electives in the proposed program Lander offers an environmental chemistry elective; this is not an option at USC-Aiken

			<ul style="list-style-type: none"> • USC-Aiken requires 142-144 hours, this program requires 122 hours
B.S., Secondary Teacher Education, Chemistry	USC – Upstate	Strong foundation in introductory chemistry classes (general, organic, inorganic, biological, analytical, physical)	<ul style="list-style-type: none"> • USC-Upstate requires calculus II & III, Intro to Computer Technology; these are not required in the proposed program • Lander requires students take an instrumental analysis course in addition to an analytical course, as well as at least two of the following: biochemistry, inorganic chemistry, environmental chemistry, organic II, physical chemistry II, geology, physical science • USC-Upstate also offers a certification only track (non-degree granting)
B.S. in Chemistry, certification only with completed Teacher Education Track	Wofford College	Admission to the teacher education portion is similar at both schools, involving disposition interviews, completion of application to the program, and at least a “C” average in the program to remain active.	<ul style="list-style-type: none"> • Certification track is offered in addition to a degree in chemistry; it is not a stand-alone degree granting program, but rather, the track only offers certification. Completing the track alone will not result in either a degree or enough coursework for certification; it must be coupled with the Chemistry major. The teacher education portion is completely separate from the Chemistry department.

Description of the Program

Projected Enrollment						
Year	Fall		Spring		Summer	
	Headcount	Credit Hours*	Headcount	Credit Hours*	Headcount	Credit Hours
2016	3	51	3	49.5	0	0
2017	5	76	5	85.5	0	0
2018	7	110	7	110	0	0
2019	9	133	9	135	0	0
2020	9	137	9	138.5	0	0

*Credit hours calculated by multiplying projected headcount by credit hours for appropriate semester from curriculum table and summing together.

Besides the general institutional admission requirements, are there any separate or additional admission requirements for the proposed program?

Yes

No

If yes, explain. (1000 characters)

Two to three new students are anticipated to enter into the program annually. The numbers in the table above indicate the project students in the program, not the projected graduates for each year. These numbers reflect the number of inquiries we have annually from students interested in teaching science at the high school level, but who quickly find Lander does not yet have a path to certification for them.

Participants in the Chemical Education major must pass the admission and disposition screenings performed by the Department of Teacher Education. This is in line with the other secondary education programs at Lander University (English and Math). The admission screening includes a GPA requirement and a passing score on the relevant PRAXIS exams. The disposition screenings prevent students from investing time and capital into a program when their ability to successfully gain employment is questionable, and ensures that those who go on to complete the program will have the necessary skills and demeanor necessary for success in the classroom.

Are there any special articulation agreements for the proposed program?

Yes

No

If yes, identify. (1000 characters)

Curriculum

Select one of the following charts to complete: Curriculum by Year **or** Curriculum by Category

Curriculum by Year

Course Name	Credit Hours	Course Name	Credit Hours	Course Name	Credit Hours
Year 1					
FALL		SPRING		SUMMER	
CHEM 111 General Chemistry I	4	CHEM 112 General Chemistry II	4		
MATH 123 Calculus I	3	MATH 211 Statistics I	3		
ENGL 101 Writing and Inquiry I	3	ENGL 102 Writing and Inquiry II	3		
UNI 101 University 101	1	General Education Course	3		
General Education Course	3	General Education Course	3		
General Education Course	3				
Total Semester Hours	17	Total Semester Hours	16	Total Semester Hours	
Year 2					
CHEM 221 Organic Chemistry I	4	BIOL 101 General Biology	4		
PHYS 201 Introductory Physics I	4	PHYS 202 Introductory Physics II	4		
General Education Course	3	EDUC 203 Field Experience I	0.5		
EDUC 204 Instructional Technology for Teachers	3	CHEM 341 Inorganic Chemistry OR 420 Environmental Chemistry OR 301 Biochemistry	3-4		
		HUMA 330 Issues in Education	3		
Total Semester Hours	14	Total Semester Hours	14.5-15.5	Total Semester Hours	
Year 3					
SPED 223 Diverse Learners	3	GEOL 111 / PSCI 112 Physical Science	4		
EDUC 321 Foundations of Reading	3	CHEM 331 Instrumental Analysis	4		
EDUC 240 Child Growth and the Educational Process	3	EDUC 223 General Pedagogy	3		
CHEM 401 Physical Chemistry	4	EDUC 329 Field Experience II	0.5		
General Education Course	3	EDUC 320 Teaching Reading in the Context Area	3		
		General Education Course	3		
Total Semester Hours	16	Total Semester Hours	17.5	Total Semester Hours	
Year 4					
EDUC 429 Field Experience III	1	EDUC 461 Clinical Practice	11		
PSCI 451* Science Pedagogy	3	EDUC 499 Teacher Education Seminar	1		
General Education Course / Elective	3	FALS 101 Fine Arts Lectureship Series	1		
General Education Course / Elective	3				
Elective	3				
Total Semester Hours	13	Total Semester Hours	13	Total Semester Hours	

*New course to be developed

Total Credit Hours Required 121-122

Course Descriptions for New Courses

Course Name	Description
PSCI 451	Science Pedagogy – An exploration of problem based teaching methods such as laboratory techniques, demonstrations, and teaching resources. Special emphasis is placed on instructional implementations of the NSTA Standards (Content knowledge, content pedagogy, learning environments, safety, impact on student learning, professional knowledge and skills). Prerequisite: formal admission to Teacher Education Program. Note: must concurrently enroll in the associated integrated arts course and field experience.

Faculty

Faculty and Administrative Personnel				
Rank	Full- or Part-time	Courses Taught or To be Taught, Including Term, Course Number & Title, Credit Hours	Academic Degrees and Coursework Relevant to Courses Taught, Including Institution and Major	Other Qualifications and Comments (i.e., explain role and/or changes in assignment)
Chair and Professor R. Layland	Full	CHEM 341	Chemistry Ph.D., University of South Carolina	No changes in assignment
Associate Professor K.L. Brodhacker	Full	CHEM 221, 222	Chemistry Ph.D., University of South Carolina	No changes in assignment
Associate Professor J. Colbert	Full	CHEM 111,301	Biochemistry Ph.D., Georgia Institute of Technology	No changes in assignment
Assistant Professor D. Delach	Full	CHEM 111, 112, 420	Environmental Toxicology Ph.D., Clemson University	No changes in assignment
Assistant Professor A. Dukes	Full	CHEM 111, 112, 330, 331	Chemistry Ph.D., Vanderbilt University	No changes in assignment
Professor D. Gardner	Full	PSCI 451*, CHEM 111, 112, 401, and 402	Chemical Education Ph.D., Purdue University	*Development of PSCI 451 (Science Pedagogy) Remainder of assignment unchanged
Professor P. Ouzts	Full	PHYS 201, 202	Physics Ph.D., University of Alabama	No changes in assignment
Professor D. Pardieck	Full	GEOL 111	Geology Ph.D., University of Arizona	No changes in assignment
Instructor D. Red	Full	PSCI 112	Physics M.S., University of Florida	No changes in assignment

Dean and Professor J. Neufeld	Full	EDUC 223, 240, 320	Education Ph.D., Arizona State University	No changes in assignment
Assistant Professor and Chair C. Gardner	Full	EDUC 102, 223, 429, 461	Education Ed.D., University of South Carolina	No changes in assignment
Instructor M. Gobble	Part	EDUC 329, 351	English M.A., University of South Carolina	No changes in assignment
Instructor R. Fernandez	Full	EDUC 106, 210, 204, 223, 290, 461, 499	Education M.Ed., Lesley College	No changes in assignment
Assistant Professor S. Fernandez	Full	EDUC 106, 329	Educational Leadership Ed.D, Union Institute and University	No changes in assignment
Associate Professor T. Garrett	Full	EDUC 320	Education Ed.D., Walden University	No changes in assignment
Assistant Professor C. Lee	Full	SPED 223	Special Education Ph.D., University of Oregon	No changes in assignment
Associate Professor M. Murphy	Full	EDUC 240, 429	Ed.D. and Ed.S., Marshall University	No changes in assignment
Associate Professor L. Vartanian	Full	EDUC 204	Ph.D., Old Dominion University	No changes in assignment

Note: Individuals should be listed with program supervisor positions listed first. Identify any new faculty with an asterisk next to their rank.

Total FTE needed to support the proposed program (i.e., the total FTE devoted just to the new program for all faculty, staff, and program administrators):

Faculty	17.5	Staff	0.5	Administration	0
---------	------	-------	-----	----------------	---

Faculty /Administrative Personnel Changes

Provide a brief explanation of any additional institutional changes in faculty and/or administrative assignment that may result from implementing the proposed program. (1000 characters)

Dr. David Gardner may be tasked to develop and teach a Science Pedagogy and Methods course as an “overload.” His background (Ph.D. in Chemical Education) makes him well suited for the position. No additional hires are required for this proposed major. The majority of the faculty FTE required for the program is already in use to provide Chemistry and other Education track coursework. There will be additional responsibilities on existing staff to advertise the program and advise for the program.

Library and Learning Resources

Identify current library/learning collections, resources, and services necessary to support the proposed program and any additional library resources needed. (1000 characters)

Library resources already reflect the needs of existing Chemistry and Teacher Education coursework. For example, all student have access to Discus (scdiscus.org) and Gale database resources. These same holdings are available to all primary and secondary students across South Carolina. Both Science and Education have the same library liaison, who intends to contribute to the support of this program by expanding her instruction to include how to teach primary and secondary students to use the library resources. New resources specific to science pedagogy can be procured over time to supplement the current holdings from the present College of Science and Math budget. The Physical Sciences department will subscribe to the *Journal of Chemical Education*, *Chemistry Education Research and Practice*, *Journal of College Science Teaching*, and other texts.

Student Support Services

Identify academic support services needed for the proposed program and any additional estimated costs associated with these services. (500 characters)

Students will benefit from the existing benchmarks system that is established under the Department of Teacher Education. They conduct disposition screening, PRAXIS test preparation, field experiences, and clinical practices. Students that fail to pass these benchmarks will utilize the support services already in place to help them get back on track. There are no additional costs required for student participation in the existing programs.

Physical Resources

Identify any new instructional equipment needed for the proposed program. (500 characters)

There is no need for new instructional equipment. The university already owns the materials necessary for the existing Chemistry and Education courses, and Dr. David Gardner already possesses the necessary materials for the new Science Pedagogy course he will develop.

Will any extraordinary physical facilities be needed to support the proposed program?

Yes

No

Identify the physical facilities needed to support the program and the institution's plan for meeting the requirements, including new facilities or modifications to existing facilities. (1000 characters)

There are no new facilities or modifications required at this time. Use of classrooms in the Science Center and Learning Center will be required. These rooms already exist and are outfitted for the needs of the classes outlined herein.

Financial Support

Estimated New Costs by Year						
Category	1st	2nd	3rd	4th	5th	Total
Program Administration	0	0	0	0	0	0
Faculty and Staff Salaries	\$21,000	\$21,000	\$22,000	\$22,000	\$23,000	\$109,000
Graduate Assistants	0	0	0	0	0	0
Equipment	0	0	0	0	0	0
Facilities	0	0	0	0	0	0
Supplies and Materials	0	0	0	0	0	0
Library Resources	\$1000	\$800	\$600	\$600	\$600	\$3600
Other*	0	0	0	0	0	0
Total	\$22,000	\$21800	\$22,600	\$22,600	\$23,600	\$112,600
Sources of Financing						
Category	1st	2nd	3rd	4th	5th	Total
Tuition Funding	\$32,256	\$53,760	\$75,264	\$96,768	\$96,768	\$354,816
Program-Specific Fees	0	0	0	0	0	0
State Funding (i.e., Special State Appropriation)*	0	0	0	0	0	0
Reallocation of Existing Funds*	0	0	0	0	0	0
Federal Funding*	0	0	0	0	0	0
Other Funding*	0	0	0	0	0	0
Total	0	0	0	0	0	0
Net Total (i.e., Sources of Financing Minus Estimated New Costs)	\$10,256	\$31,960	\$52,664	\$74,168	\$73,168	\$242,216

*Provide an explanation for these costs and sources of financing in the budget justification.

Budget Justification

Provide a brief explanation for the other new costs and any special sources of financing (state funding, reallocation of existing funds, federal funding, or other funding) identified in the Financial Support table. (1000 characters)

Note: Institutions need to complete this budget justification *only* if any other new costs, state funding, reallocation of existing funds, federal funding, or other funding are included in the Financial Support table.

Income from tuition was determined by multiplying the number of students per year by the present annual tuition (\$10,752/yr).

The only new costs associated would be to teach one new lecture course, once per academic year. Currently, an overload course for a Lander University faculty is \$2,400 per course, and this is how the course will be covered. Two students taking the course at the present cost of \$448 per credit will cover the full expense of this overload.

The library funding represents money already allocated to procuring resources for the Chemistry department. At this time, we have the funding available to obtain the three journals noted in the "Library Resources" section earlier in this document.

Students will participate in existing clinical experiences and student teaching programs at Lander, so additional budgeting is not anticipated at this time. Materials required for the Science Pedagogy (CHEM 451) course are already present at Lander, as they are also used in courses already being taught. New materials specific to the CHEM 451 coursework (i.e. kits and models) are already owned by the projected instructor (Dr. D. Gardner).

Expansion of library holdings has already been allotted into the annual budgets; procurement of Science Education resources will come from the College of Science and Math portion of the annual Lander University library budget.

Evaluation and Assessment

Programmatic Assessment: Provide an outline of how the proposed program will be evaluated, including any plans to track employment. Identify assessment tools or software used in the evaluation. Explain how assessment data will be used. (3000 characters)

The Teacher Preparation Advising Committee at Lander University consistent of education professionals across the university that review requirements for admission and clinical practice. The group meets four times each year to ensure that the current and future instruction and experiences for students meets all criteria and standards, as well as to review employment data. They propose and implement changes to the curriculum when necessary and on a timely basis to ensure that students will be well prepared and have the best opportunities possible for employment.

The Department of Teacher Education student teaching and clinical practice experiences are designed to have all students meet the certification criteria and standards. All teacher candidates complete a Teacher Work Sample as part of their coursework that is not only clearly defined in a rubric provided to the students, but that is also aligned clearly with the ADEPT standards. This alignment will be expanded to include alignment with NSTA standards.

Assessment will be completed by the Teacher Education department. The success rate of the PRAXIS I and II exams will be tracked and analyzed. Additionally, information about how students perform in their observations and student teaching experiences will be collected in the School of Education courses. This presently consists of rubrics completed by the Cooperating Teachers during observations and student teaching experience that speak to the preparation and performance of students, as well as completion of the Teacher Work Sample. An annual review of collected data will be performed each summer, and a short letter shall be submitted before the start of the fall semester regarding any suggestions or changes to the program. Presently, the individuals that complete the ADEPT and CAEP assessments have course releases that allow for ample time to be dedicated to this work. This assessment will be expanded to include NSTA standards; Chemistry and Teacher Education faculty will work together to complete this assessment.

Student Learning Assessment

Expected Student Learning Outcomes	Methods of/Criteria for Assessment
Demonstrate understanding of chemical principles at the introductory level	Content examination for the Chemistry Department OR successful completion of the PRAXIS II Chemistry Content Area exam
Demonstrate appropriate classroom management practices and techniques	Part of student teaching assessment by cooperating teachers and Lander's School of Education
Demonstrate skills necessary to manage safely and appropriately the collection, analysis, and interpretation of data in laboratory instructional setting	Assessed as part of Science Pedagogy course, as well as in other laboratory courses
Demonstrate appropriate scientific communication skills required to prepare and present an effective instructional lesson	Assessed as part of Science Pedagogy courses

Will the proposed program seek program-specific accreditation?

Yes

No

If yes, provide the institution's plans to seek accreditation, including the expected timeline for accreditation. (500 characters)

The program will seek national recognition from NSTA and to meet accreditation standards from CAEP. The Department of Teacher Education will ensure that the CAEP standards are met, and the Chemistry faculty will work to seek NSTA recognition. It is projected that after the science pedagogy course is developed, the NSTA recognition will be attained. This may be completed within a year of program approval.

Will the proposed program lead to licensure or certification?

Yes

No

If yes, explain how the program will prepare students for licensure or certification. (500 characters)

Students will be advised to take the required PRAXIS I exam as freshmen, and may elect to take the courses already offered on campus to prepare to sit for the exam. Students will prepare to take the PRAXIS II Chemistry Content exam as part of their PSCI 451 course. Additional fingerprinting and certification requirements such as observation hours and student teaching will be coordinated as part of the education coursework. Teacher candidates will complete a Teacher Work Sample that indicates their effectiveness in the classroom. This assignment will be assessment by Teacher Education faculty, as well as by Chemistry faculty. The present Work Sample is designed to align with ADEPT standards; this will be expanded to meet NSTA standards.

Teacher or School Professional Preparation Programs

Is the proposed program a teacher or school professional preparation program?

Yes

No

If yes, complete the following components.

Area of Certification

Chemistry

Please attach a document addressing the South Carolina Department of Education Requirements and SPA or Other National Specialized and/or Professional Association Standards.

Section III: South Carolina Department of Education Requirements

Assurances and Alignment with Standards

A. ADEPT Standards

APS 1 Long-Range Planning: An effective teacher facilitates student achievement by establishing appropriate long-range learning goals and by identifying the instruction, assessment, and management strategies necessary to help all student progress toward meeting these goals

Students will discuss lesson planning, long-range planning in EDUC 351 – *General Pedagogy for Middle and High School* in their junior year. This course is taught by Department of Teacher Education faculty, most of whom have terminal degrees in their field and all have at least a Masters degree in the field. Additionally, students will develop Unit Plans as part of EDUC 223 – *General Pedagogy* using TaskStream Software. The unit plans will include not only the content that is to be covered, but also the NSTA standards that each lesson meets. This will be assessed both in that class and as part of the overall portfolio at the end of the program. Metrics will be run by Kym Kirby annually on the TaskStream submissions to ensure that students are meeting the ADEPT standards.

TaskStream portfolios will be reviewed by Chemical Education faculty to be sure that students are on schedule and indicating progress on the ADEPT standards. Students that are not on track to meet the standards successfully upon graduation will be identified through this policy, and will need to meet with their advisor to discuss how to remedy the problem. If trends are identified (i.e. one particular standard that all students are struggling to meet), then the Chemical Education faculty can meet together with the Department of Teacher Education faculty to determine what can be done to help our students achieve success. This will be performed for all ADEPT standards. Additionally, there is a Teacher Preparation Advisory Committee that consists of Lander University faculty that meets quarterly to ensure that the requirements of the teacher education programs are met. This same group will institute any changes necessary to remain in compliance and up-to-date with any changes that are instituted.

APS 2 Short Range Planning of Instruction: An effective teacher facilitates student achievement by planning appropriate learning.

APS 3 Planning Assessments and Using Data: An effective teacher facilitates student achievement by assessing and analyzing student performance and using this information to measure student progress and guide instructional planning.

Students will be introduced to lesson planning in EDUC 203 – *Field Experience I*, and then delve deeper by generating their own lesson plans in EDUC 223 - *General Pedagogy* and EDUC 240 – *Child Growth and the Educational Process*. Using the TaskStream templates will ensure that all Chemical Education teacher candidates are writing lessons that take into account the materials necessary, the content to be covered, any safety concerns, and the standards to be met by each lesson; as well as including rubrics for evaluation of student work. Use of TaskStream allows for data collection and analysis. The second and third standards will be assessed both in that class and as part of the overall portfolio at the end of the program.

APS 4 Establishing and Maintaining High Expectations: An effective teacher establishes, clearly communicates, and maintains appropriate expectations for student learning, participation, and responsibility.

Teacher candidates will learn about how to receive high caliber work from their students from their experiences at Lander University. Namely, our high expectations for teacher candidates will help them to expect the same from their students.

APS 5 Using Instructional Strategies to facilitate student learning: An effective teacher promotes student learning through the effective use of appropriate instructional strategies

Students learn about instructional strategies in a number of courses: EDUC 204 – *Instructional Technology for Teachers*, EDUC 210 – *Communication in Diverse Classrooms*, EDUC 223 – *General Pedagogy*, and EDUC 290 – *Experiential Learning in Community and School Settings*. They will have the opportunity to practice these strategies in class, as well as put them to use during the Field Experiences (EDUC 203, 329, and 429). These will be assessed as part of the assignments in class, as the final portfolios submitted before graduation, and as part of the field experiences.

APS 6 Providing Content for Learners

An effective teacher possesses a thorough knowledge and understanding of the discipline so that he or she is able to provide the appropriate content for the learners.

Teacher Candidates will delve into science during the first three years of their work at Lander University. Teacher Candidates are required to take CHEM 111/112 - *General Chemistry I and II*, CHEM 221 - *Organic Chemistry I*, CHEM 331 - *Instrumental Analysis*, and CHEM 401 - *Physical Chemistry I*. They are also required to take an additional two electives that should serve to enhance either the breadth or depth of their chemical knowledge. This is achieved by taking the second half of the organic or physical chemistry courses, or heading in a new direction and learning about biochemistry, environmental chemistry, or inorganic chemistry. Additionally, teacher candidates are required to take two semesters of physics. Department of Physical Sciences faculty hold at least a masters in Physical Science fields; the majority hold terminal degrees in their field.

Student mastery in these fields will be assessed by GPA – teacher candidates are required to receive a “C” or better in all science courses. Annual portfolio and GPA reviews will be conducted by the Chemical Education faculty. Any students that do not meet the appropriate benchmarks will be asked to meet with their advisor to come up with a plan to address the concerns. They will also be placed on probation for one semester. If substantial progress is not made during the probationary semester, the student will no longer be able to participate in the program. These standards will be incorporated into the Lander University Course Catalogue, and thus made available to all students upon enrollment.

APS 7 Monitoring, Assessing, and Enhancing Learning: An effective teacher maintains a constant awareness of student performance throughout the lesson in order to guide instruction and provide adequate feedback to students.

Students will learn how to assess student work in courses such as EDUC 240 – *Child Growth and the Educational Process*, EDUC 223 – *General Pedagogy*, and EDUC 351 – *General Pedagogy for Middle and High School*. TaskStream assignments will include aspects of assessment from development of worksheets and assignments to generation of rubrics for student assessment. These will be reviewed as part of the TaskStream data collection and reporting, and will guide the program as we aim to continually improve.

APS 8 Maintaining an environment that promotes learning: An effective teacher creates and maintains a classroom environment that encourages and supports student learning.

APS 9 Managing the Classroom: An effective teacher maximizes instructional time by efficiently managing student behavior, instructional routines and materials, and essential non-instructional tasks.

Students will learn about standards 8 and 9 in courses such as EDUC 240 – *Child Growth and the Educational Process*, EDUC 223 – *General Pedagogy*, and EDUC 351 – *General Pedagogy for Middle and High School*, as well as having the opportunity to put these skills to use in their Field Experiences (EDUC 203, 329, and 429). Classroom management is an important aspect of these classes, which should give students experience working with the techniques before applying them in the field experiences. Students will be evaluated in class and especially in the Field Experiences using the current Department of Teacher Education frameworks such that they will have ample time to learn from their mistakes and improve before applying for certification.

APS 10 Professional Responsibilities: An effective teacher is an ethical, responsible, contributing, and ever-learning member of the profession.

Ethics are discussed throughout the course of teacher candidate studies at Lander University; this begins during the first semester and continues through to their last semester. Ethics are discussed in all education coursework. Additionally, PSCI 451 – *Science Pedagogy* will address the responsibilities scientists have to the individual, to fellow scientists, and to society. This will help them to understand both their role as teachers, as well as the role their students may potentially play in society. The disposition assessments evaluated by the Teacher Preparation Assessment Sub-Committee should identify any individuals for whom ethics should be reinforced, as well as in the classroom. Lander has a strict Student Behavior policy in the Student Handbook issued to all newly enrolled students. Our University 101 courses thoroughly cover what the expectations are, and all students are required to take this course in order to graduate. Any students that are guilty of policy infractions will be addressed by the instructor, and potentially by the Dean and/or Academic Affairs and Student Affairs Honor Council.

B. PADEPP Standards

The proposed program is not an Educational Leadership program. As such, these standards are not pertinent to the proposed program.

C. Education Economic Development Act (EEDA)

Lander University's Chemical Education program will reach out to high schools across South Carolina, in hopes that students whose personal interests, skills, and talents would be a good fit for our program will be able to apply and enroll at Lander University. In time, the Department of Physical Sciences could serve as a Regional Education Center in the state, offering professional development workshops and coursework that aligns with the standards set forth by the state.

D. South Carolina Standards of Conduct

Applicants to the program will need to pass a background check before enrolling in the program. These background checks will be coordinated through the Department of Teacher Education with the other applicants to the teacher education programs at Lander. A screening of applicants will take place during the semester the application to the program is received; screenings will be administered by faculty in the Department of Teacher Education at Lander University. Instructors from the education courses that students take in their freshmen and sophomore years will submit their opinions of their students; an interview with Department of Teacher Education faculty will take place if there are any questions as to the suitability of a teacher candidate. Students that are ultimately found not to possess the appropriate disposition will meet with the coordinator of the program and directed into other majors at Lander University. Additional checks on disposition and ability will take place during the observation and student teaching experiences by the cooperating teachers and Department of Teacher

Education faculty. This screening process is intended to identify students that may not find success in the program early on, such that they can pursue other paths.

E. South Carolina Safe School Climate Act

Teacher candidates will be educated about how to recognize and address instances of bullying in their coursework; specifically, EDUC 202- *Education in America*, EDUC 203 – *Field Experience I*, and EDUC 240 – *Child Growth and the Educational Process* address these issues. Teacher candidates will also have the opportunity to develop their skills in this area during their student teaching experience.

F. PreK-12 Academic Standards

Teacher candidates will learn how to develop Student Learning Objectives (SLOs) in the required course EDUC 429 – *Field Experience III*, where they will design and implement lessons from the science curriculum that include strategies for meeting the needs of diverse learners. The required course SPED 240 – *Characteristics of Diverse Learners* will help the teacher candidates to recognize where students need extra help or extra challenges. More in depth understanding of the standards students should meet are explained in EDUC 351 – *General Pedagogy for Middle and High School*. Additionally, student will have experience using TaskStream in a variety of courses; each lesson plan will have the applicable state standards identified and attached to the lessons.

G. Admission Requirements – Initial and Advanced (Assurance of Compliance)

The IHE agrees to integrate the applicable ADEPT Performance Standards throughout each candidate’s coursework, field experiences, and clinical practice so that candidates understand and are able to apply these standards.

H. Eligibility for Initial Certification (Assurance of Compliance)

The IHE agrees to integrate the applicable ADEPT Performance Standards throughout each candidate’s coursework, field experiences, and clinical practice so that candidates understand and are able to apply these standards. Candidates for secondary education have completed at least 30 semester hours in Chemistry.

The eligibility requirements for Chemical Education align with those of the Lander University School of Education:

Students must take the PRAXIS core exam during their freshman year or during the semester enrolled in their first education course. Students can provide evidence of a composite score of 24 on the ACT or a combined score of 1650 (or 1100 on the combined math/reading scores) on the SAT in lieu of PRAXIS Core. It is the responsibility of the student to provide official documentation from ACT or ETS if used in place of PRAXIS Core.

Students will be admitted to teacher education programs at Lander University provided the following criteria are met:

1. The student has submitted an application to the Department of Teacher Education for admission into the teacher education program. Applications should be submitted when enrolled in EDUC 202 or HUMA 330. Failure to submit an application in a timely manner will likely delay a student’s completion of the teacher education program
 - a. Transfer and second-degree students: applications for admission into the teacher education program should be submitted during the first semester at Lander University.
2. Student has achieved a minimum cumulative grade point average of 2.75 on a 4.0 scale after completing at least 45 credit hours towards their degree program.
 - a. This also applies to traditional, transfer, and second-degree seeking students.
3. The student has earned a grade of “C” or better in English 102 and EDUC 202. The student must have also earned a grade of “B” or better in EDUC 203.

4. The student has successfully completed the PRAXIS Core, and/or other state mandated examinations. (ACT composite score of 24, or SAT combined scores of 1650 (1100 for math reading) may be submitted in lieu of PRAXIS Core)
5. The student has completed at least 45 semester hours of coursework that will apply to degree requirements of the university.
 - a. Transfer and second-degree seeking students have a requirement of 12 hours of coursework taken at Lander University which will apply to the teacher education program.
6. The student has completed the requirements of the Teacher Education Screening Committee. In order to schedule a screening interview, the student must:
 - a. Successfully meet requirements 1-5 above
 - b. Complete the screening interview application packet by the date specified prior to a scheduled interview.
7. The student must pass written and oral components of the screening process. If a student fails to pass the failed component, that student will not be allowed to take additional 300- and 400-level education courses.
8. The student is approved by the Teacher Preparation Assessment Sub-Committee.

Students who are admitted to the program will be subject to ongoing evaluation. To continue in good standing in the program, students must meet the following standards:

1. Maintain a cumulative GPA of at least 2.75;
2. Maintain a grade point ratio of at least 3.00 in all professional education courses (300- and 400-level);
3. Achieve a grade of "B" or better in each field experience;
4. Achieve a grade of "C" or better in all EDUC, CHEM, and SPED prefix courses; and
5. Display professional dispositions and behaviors.

A student who has been admitted to teacher education but fails to maintain any one of the above standards will be given one probationary semester to reestablish compliance with the standard(s) before being withdrawn from the program. However, students completing a clinical experience will not automatically be permitted to repeat the experience.

Failure to reestablish the five standards will require the student to reapply for admission to the teacher education program after that student has met all requirements for admission. A student whose dispositions and/or behaviors no longer meet professional standards will not be allowed to continue in the program. The Chair of the Department of Teacher Education, the Chair of the Department of Physical Sciences, and the Dean of the College of Education will determine necessary remedial action(s) to address the dispositional concerns. If sufficient action is taken, a reapplication for admission to the program may be permitted.

I. Field and Clinical Experiences Requirements

Students are required to meet the requirements and to complete the field and clinical experiences already required by the Lander University School of Education.

Criteria Governing Admission to Clinical Practice (Student Teaching)

To be admitted to the clinical practice, a student must:

1. Submit an application for Educator Certificate and required documentation to the State Department of Education six (6) months prior to scheduled student teaching semester. **For Spring clinical practice, these applications are due to the Department of Teacher Education by April 1st. For Fall clinical practice, applications are due January 15th. Late applications cannot be accepted.** In addition, a separate Clinical Practice Request Form must be submitted to the Department of Teacher Education by February 1st for fall and October 1st for spring.
2. Be admitted into the teacher education program at least one semester prior to the clinical practice experience.

3. Complete most general education courses. IF more than two general education courses have not been complete, approval by the Dean of the College of Education and the Dean of the College of Science and Mathematics is required.
4. Complete all professional education courses and all major courses.
5. Meet Teacher Education assessment requirements demonstrating an acceptable level of competence in all learner outcomes of the Professional Educator.
6. Be approved by Unit Faculty.

Student who fail to meet these criteria and are not granted admission to clinical practice will have the right to request an appeal through the Teacher Preparation Assessment Sub-Committee. Such requests will be directed to the Sub-Committee through the Dean of the College of Education.

J. Annual Reports (AACTE / NCATE and Title II)

Annual reports will be generated using TaskStream software and cooperating with the Lander University Department of Teacher Education Field Experiences Coordinator. All students in the program will submit their work using this software, and the moderators will be able to generate reports using the standards students tag in their assignments. This allows for collection of qualitative and quantitative data and metric assessment.

K. Commitment to Diversity Assurance

It is the policy of Lander University to prohibit discrimination on the basis of age, color, disability, gender, national origin, race, pregnancy, religion, sex, veteran's status, and genetic information in regard to the administration of all campus programs, services and activities including intercollegiate athletics, the admission of students, employment actions, or other sponsored activities and programs as included in Title VII and Title IX.

L. Professional Development Courses

The Department of Physical Sciences may offer professional development courses in the future. These courses would be closely aligned with the National Staff Development Council's standards for Staff Development, as well as National Science Teacher Association standards.

M. Advanced Programs for the Preparation of Teachers Alignment with NBPTS

The IHE will comply with the standards put forth by the National Board of Professional Teaching Standards:

1. Build a continuum of experiences that supports teachers in their growth and development.
2. Strengthen entry into the teaching profession;
3. Improve professional learning and growth systems, including strong pathways for board certification. The required coursework is both aligned with professional standards, as well as designed to help teacher candidates develop confidence in their abilities. They will build upon small successes before they are asked to take on greater responsibilities. Additionally, the criteria before engaging in field experiences is structured such that students who will have success should easily be placed in a classroom where they can succeed. Those that may falter should be identified through the Teacher Preparation Assessment Sub-Committee interviews and screening processes.
4. Create opportunities for teacher leadership so that teachers, like other professionals, take primary responsibility for their profession

The proposed schedule of coursework (Section II) is structured such that teacher candidates have increasing control over both the process and content of their lessons, as guided by state and national standards. They will have a series of field experiences that allows them to begin as observers in the classroom, transition into teaching

individual lessons, and grow into spending entire days in the classroom and being responsible for lesson planning. Likewise, the scientific component of the curriculum is structured such that students will be able to draw from their foundational knowledge of chemistry and apply it to real life situations and laboratory settings. They will have hands-on experience with industry standard instrumentation, as well as experience working with various modelling software. Chemical Education teacher candidates will learn how to both ask a question and seek out the answers for themselves, encouraging professional growth and development. The GPA criteria of a C or better in all coursework will also ensure that they have a strong knowledge base to draw from. This satisfies Standard 1.

The pedagogy courses should instill an understanding of how the process of teaching is integral to student understanding. In taking these courses, the teacher candidates will come to see how their choices will dictate their success – not only in the academic setting, but in the classroom as well. The field experience series will help to develop this responsibility in our students. Our campus also has innovative ways to develop leadership in teacher candidates, including the Call Me MISTER program. Opportunities exist within the Department of Physical Sciences, too; students may choose to participate in the American Chemical Society or Environmental Science Student Organizations, which have small student-run businesses that manufacture products such as soap and biodiesel that are used for various purposes on campus. Both organizations also have service components that include outreach to local schools. Chemical Education teacher candidates could contribute greatly to these initiatives, as well as develop their own leadership skills before entering their own classrooms. This satisfies Standards 2, 3, and 4.

N. Experimental or Innovative Programs Policy (Assurance of Compliance)

The IHE will comply with the SCDE policy for Experimental or Innovative Programs where applicable.

O. International Society for Technology in Education (ISTE) Standards Alignment

1. Facilitate and inspire student learning and creativity
2. Design and develop digital age learning experiences and assessments
3. Model digital age work and learning
4. Promote and model digital citizenship and responsibility
5. Engage in professional growth and leadership

Lander students will accomplish this through creative lessons and lab experiences, where students will have the ability to have hands-on interaction with scientific concepts. These may include using state of the art laboratory equipment, lab kits, or digital models and experiences. This will be completed in the EDUC 223 – *General Pedagogy* and PSCI 451 – *Science Pedagogy* courses, and satisfies Standard 1.

Lander students will use technology such as PowerPoint, Prezi, and Weebly to create interactive presentations. Teacher candidates will incorporate SmartBoard technology into their work. All technology will be used in a fashion such that IEPs and different learning styles are accommodated. This will be completed in EDUC 223 – *General Pedagogy*, and satisfies Standards 2 and 3.

Lander students will be expected to appropriately cite and use digital resources, as well as to maintain a professional presence on the internet. The experiences they have in the Lander classrooms will transfer seamlessly when they hold their students to the expectations of professionalism and honesty. Appropriate use of and citations for resources will be addressed in the required courses CHEM 221 – *Organic Chemistry I*, CHEM 331 – *Instrumental Chemistry*, CHEM 341 – *Inorganic Chemistry*, CHEM 499 – *Senior Seminar*, and other chemistry elective courses, and satisfies Standard 4.

Lander students will have the opportunity to participate in classes and workshops that integrate up-to-date technology. In particular, the Chemical Education program will incorporate instrumentation and models that help scientists around the world to better understand how matter behaves. These experiences will enhance the teacher candidates' understanding of chemistry, as well as create opportunities for them to collaborate with Lander faculty in the future for field trips and even collaborative experiments between secondary and post-secondary cohorts. This will be accomplished in CHEM 331- *Instrumental Chemistry*, CHEM 451 – *Science Pedagogy*, and satisfies Standard 5.

Section IV:

SPA or Other National Specialized and/or Professional Association Standards

National Science Teacher Association Standards for Science Teacher Preparation

NSTA Standard 1: Content Knowledge

Effective teachers of science understand and articulate the knowledge and practices of contemporary science. They interrelate and interpret important concepts, ideas, and applications in their fields of licensure.

Below are the elements of the standard.

Pre-service teachers will:

- 1a) Understand the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields as recommended by the National Science Teachers Association.
- 1b) Understand the central concepts of the supporting disciplines and the supporting role of science-specific technology.
- 1c) Show an understanding of state and national curriculum standards and their impact on the content knowledge necessary for teaching P-12 students.

Assessment:

This Standard is usually met using Assessments 1-state licensure exam and Assessment 2 - comprehensive content exams or science courses' GPA and content analysis form.

NSTA Standard 2: Content Pedagogy

Effective teachers of science understand how students learn and develop scientific knowledge. Preservice teachers use scientific inquiry to develop this knowledge for all students. Below are the elements of the standard.

Pre-service teachers will:

- 2a) Plan multiple lessons using a variety of inquiry approaches that demonstrate their knowledge and understanding of how all students learn science.
- 2b) Include active inquiry lessons where students collect and interpret data in order to develop and communicate concepts and understand scientific processes, relationships and natural patterns from empirical experiences. Applications of science-specific technology are included in the lessons when appropriate.
- 2c) Design instruction and assessment strategies that confront and address naïve concepts/preconceptions.

Assessment:

This Standard is usually met using Assessment 3 -Unit Plan.

NSTA Standard 3: Learning Environments

Effective teachers of science are able to plan for engaging all students in science learning by setting appropriate goals that are consistent with knowledge of how students learn science and are aligned with state and national standards. The plans reflect the nature and social context of science, inquiry, and appropriate safety considerations. Candidates design and select learning activities, instructional settings, and resources -- including science-specific technology, to achieve those goals; and they plan fair and equitable assessment strategies to evaluate if the learning goals are met. Below are the elements of the standard.

Pre-service teachers will:

3a) Use a variety of strategies that demonstrate the candidates' knowledge and understanding of how to select the appropriate teaching and learning activities – including laboratory or field settings and applicable instruments and/or technology - to allow access so that all students learn. These strategies are inclusive and motivating for all students.

3b) Develop lesson plans that include active inquiry lessons where students collect and interpret data using applicable science -specific technology in order to develop concepts, understand scientific processes, relationships and natural patterns from empirical experiences. These plans provide for equitable achievement of science literacy for all students.

3c) Plan fair and equitable assessment strategies to analyze student learning and to evaluate if the learning goals are met. Assessment strategies are designed to continuously evaluate preconceptions and ideas that students hold and the understandings that students have formulated.

3d) Plan a learning environment and learning experiences for all students that demonstrate chemical safety, safety procedures, and the ethical treatment of living organisms within their licensure area.

Assessment: This Standard is usually met using Assessment 3 - Unit Plan.

NSTA Standard 4: Safety

Effective teachers of science can, in a P-12 classroom setting, demonstrate and maintain chemical safety, safety procedures, and the ethical treatment of living organisms needed in the P-12 science classroom appropriate to their area of licensure. Below are the elements of the standard.

Pre-service teachers will:

4a) Design activities in a P-12 classroom that demonstrate the safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used within their subject area science instruction.

4b) Design and demonstrate activities in a P-12 classroom that demonstrate an ability to implement emergency procedures and the maintenance of safety equipment, policies and procedures that comply with established state and/or national guidelines. Candidates ensure safe science activities appropriate for the abilities of all students.

4c) Design and demonstrate activities in a P-12 classroom that demonstrate ethical decision-making with respect to the treatment of all living organisms in and out of the classroom. They emphasize safe, humane, and ethical treatment of animals and comply with the legal restrictions on the collection, keeping, and use of living organisms.

Assessment: This Standard is usually met using Assessments 3 -Unit Plan and Assessment 4-Student Teaching Observation Form

NSTA Standard 5: Impact on Student Learning

Effective teachers of science provide evidence to show that P-12 students' understanding of major science concepts, principles, theories, and laws have changed as a result of instruction by the candidate and that student knowledge is at a level of understanding beyond memorization. Candidates provide evidence for the diversity of students they teach. Below are the elements of the standard.

Pre-service teachers will:

5a) Collect, organize, analyze, and reflect on diagnostic, formative and summative evidence of a change in mental functioning demonstrating that scientific knowledge is gained and/or corrected.

5b) Provide data to show that P-12 students are able to distinguish science from non-science, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science.

5c) Engage students in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner.

Assessment: This Standard is usually met using Assessment 5 –Evidence of P-12 student learning.

Standard 6: Professional Knowledge and Skills

Effective teachers of science strive continuously to improve their knowledge and understanding of the ever changing knowledge base of both content, and science pedagogy, including approaches for addressing inequities and inclusion for all students in science. They identify with and conduct themselves as part of the science education community.

Below are the elements of the standard.

Pre-service teachers will:

6a) Engage in professional development opportunities in their content field such as talks, symposiums, research opportunities, or projects within their community.

6b) Engage in professional development opportunities such as conferences, research opportunities, or projects within their community.

Assessment: This Standard is usually met using Assessment 6 –Evidence of Professional Knowledge and Skills

How Lander University's Chemical Education Program will assess these Standards:

Assessment 1–Science content knowledge - Licensure tests. Information must be given as to the name of all licensure tests required by candidates. There must be a description between the licensure test content and the NSTA standards. If the test is a science content Praxis II test, the alignment is not required. This matches 2012 NSTA Standard 1.

Lander University Chemical Education teacher candidates will take the PRAXIS I and II exams to fulfill this standard. The PRAXIS I exam covers basic knowledge, the PRAXIS II exam is content specific. This protocol is identical to those used in the secondary education programs across the university.

Assessment 2 – Science content knowledge – General content knowledge of candidates can be shown using content grade point averages, portfolio requirements, or comprehensive examinations that match 2012 NSTA Standard 1.

Lander University Chemical Education teacher candidates will need to maintain a C or better average (2.0 out of 4.0) in their Chemistry courses. This will be checked biannually by the faculty advisor for Chemical Education, and students that fall below the requirement will be placed on probation for one semester. If after that probationary period there is no progress, the student will not be able to continue in the program.

Assessment 3 – Pedagogical and professional knowledge and skills – Planning instruction and assessment. These skills are shown in a Unit Plan.

Lander University Chemical Education teacher candidates will complete a Unit Plan as part of their coursework in *PSCI 451 – Science Pedagogy*. The unit plan will not only map out the topics to be addressed, but also indicate which standards are met in each lesson. This will be submitted as part of the TaskStream portfolio. Additionally, these skills will be assessed in the Teacher Work Sample that all teacher candidates must submit to the Teacher Education Department before graduation. This Work Sample is presently aligned with ADEPT Standards, and will be expanded to meet NSTA standards.

Assessment 4 – Pedagogical and professional knowledge and skills - Student Teaching Assessment with Legal/Safety/Ethical Issues. This instrument could be a formative or summative instrument that focuses on each element and used in a clinical or practicum setting.

Lander University School of Education protocols for student teaching experiences will be adopted for this assessment. Students will be observed numerous times during their student teaching, and their cooperating teachers will complete a formal assessment of their ability to teach well. This assessment will include questions about the candidate's understanding of legal/safety/ethical issues, as well as provide an opportunity for the cooperating teacher to include feedback on these points.

Assessment 5 – Effects on student learning - Knowledge and skills are exemplified in the candidate's ability to effect learning with secondary students. This type of assessment usually involves the use of pre and post-test results that match the standards and allows the candidate to reflect on their teaching.

Teacher candidates will administer a pre-test to their students at the beginning of their student teaching experience. A post-test will also be administered at the end of the student-teaching experience. The results will be compiled by Lander University faculty, and shared with the teacher candidate. Both assessments, their respective results, and a reflection completed by the teacher candidate will be compiled and entered into their TaskStream portfolio. The Teacher Work Sample will also inform assessment of this standard.

Assessment 6 –Pedagogical and professional knowledge and skills – These are important concepts related to the candidate's science content area and to science education. The instrument is left to the program to decide the best method for collecting data.

Teacher candidates will be expected to maintain a C or better grade point average in their chemistry coursework, as well as compile a comprehensive portfolio of teaching materials throughout their time in the Chemical Education program. Lander University's Secondary Certification in Chemistry Committee will complete annual Teacher Work Sample Reviews for students in the program. They will use the NSTA suggested rubric for Assessment 5 (see Appendix) to score the work samples. TaskStream software will be used for work sample development; this software allows candidates to develop comprehensive lesson plans, rubrics, and other teaching materials over the course of their time at Lander. These work samples can be submitted to other accrediting bodies as deemed appropriate for maintaining the Chemical Education program at Lander University.

Additionally, the Lander University School of Education benchmarks will be adopted by this program. Currently, this entails a disposition assessment during the teacher candidate's sophomore year, and additional checks before, during, and after the student teaching experiences.