



### Background Information

Provide a detailed description of the proposed modification, including its nature and purpose and centrality to institutional mission. (1500 characters)

This modification to the traditional Chemistry major will allow students to focus on coursework that will prepare them for careers such as working in a crime laboratory. The goal of this emphasis is to allow students to develop strong analytical skills and an understanding of the legal framework for this type of science. For example, students will be required to take a new microscopy course that will allow them to test trace chemical evidence without destroying it. These skills are integral when cases are consistently retried and evidence retested with new methods; traditionally, chemistry classes are not focused on maintaining the integrity of the sample after analysis. This course would be the first of its kind to be offered in a South Carolina public, higher education institution.

Additionally, this new emphasis aligns closely with the goals of the university. Our new President, Dr. Richard Cosentino, has designated fourteen signature programs and study areas for the university – forensic science is one of those specialized areas of study.

List the objectives of the modified program. (1500 characters)

Students will:

- Demonstrate analytical skills that can be applied in a laboratory position  
Coursework in general, inorganic, organic, and physical chemistry laboratories will develop the skills necessary to obtain and excel in introductory laboratory positions. Our existing analytical chemistry course will provide learning experiences that will lead to mastery in titration techniques; our instrumental course will ensure that students are up-to-date on not only how cutting edge technologies work to analyze samples, but will also provide experience using such instruments.
- Demonstrate the ability to assess evidence without negatively impacting its integrity  
The new microscopy course speaks to this objective. This provides students with the methods to assess trace evidence while maintaining its integrity such that it can be used again if a case is reopened. This is different in scope from traditional chemistry courses that often completely consume an analyte over the course of the assessment.
- Demonstrate an understanding of how evidence collection influences the results of different analyses of that evidence  
This objective is specific to the forensics emphasis, not the traditional chemistry major. Students will learn about the evidence collection techniques that aim to obtain reliable samples, as well as the protocols that govern the chain of custody. In particular, the forensic science course will examine how evidence collection and analysis is governed by the laws of South Carolina and what standard practices exist to guide the investigator. Political science coursework will also address the intersection of policy and science.

### Assessment of Need

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

The U.S. Bureau of Labor Statistics' Occupational Outlook Handbook (<http://www.bls.gov/ooh/media-and-communication/home.htm>) indicates that there are 80 forensic science technicians working in South Carolina, and the average pay is on par with the average income in the state. The Handbook indicates that nationwide, employment opportunities related to forensic science are growing. In addition, projections from Career One Stop initiative indicate the field should be about 20% larger in 2020 as compared to the size in 2010.

Examination of the following websites found no employment projections for Forensic Science in South Carolina: Central SC Alliance (<http://www.centralsc.org>), Charleston Regional Development Alliance <http://www.crda.org>, Economic Development Partnership <http://www.edpsc.org>, Northeastern Strategic Alliance <http://www.nesasc.org>, Southern Carolina Regional Development Alliance <http://www.southerncarolina.org>, Upstate Alliance <http://www.upstatescalliance.com>, and SC Dept. of Commerce <http://sccommerce.com>.

Will the proposed modification impact any existing programs and services at the institution?

Yes

No

If yes, explain. (1000 characters)

The program will expand the offerings of the chemistry department, as well as increase enrollment in existing classes. As the emphasis is projected to enroll fewer than 8 additional students each year, this should not cause any problems such that additional sections of courses will need to be taught. The additional courses may become major electives for chemistry majors who are not seeking the Forensic Science emphasis. This could also provide elective opportunities for other science majors (Environmental Science and Biology). Removing some of the students from courses included in the traditional Chemistry B.S. degree will not negatively impact that major. The courses are large enough that a fluctuation in enrollment of one to two students annually will not impact the ability to offer those courses.

**List of Similar Programs in South Carolina**

<b>Program Name</b>	<b>Institution</b>	<b>Similarities</b>	<b>Differences</b>
Chemistry with Forensic Chemistry Concentration	Newberry College	<ul style="list-style-type: none"> <li>• Students receive a robust chemical education, including general, inorganic, organic, and physical chemistry coursework and laboratories.</li> <li>• Forensics coursework will be coordinated by former crime laboratory professionals.</li> </ul>	<ul style="list-style-type: none"> <li>• Students learn about microscopic techniques to assess trace evidence in Lander's microscopy course; this includes analysis of biological and inorganic samples.</li> </ul>
Forensic Science	Southern Wesleyan University	<ul style="list-style-type: none"> <li>• Students receive a robust chemical education, including general, inorganic, organic, and physical chemistry coursework and laboratories.</li> <li>• Students learn about microscopic techniques to assess trace evidence; this includes analysis of biological and inorganic samples.</li> </ul>	<ul style="list-style-type: none"> <li>• Students at SWU will take coursework in anatomy, physiology, and molecular biology. The proposed emphasis will have a stronger chemistry focus at Lander University.</li> </ul>
Crime Scene Investigation Certificate	Trident Tech	<ul style="list-style-type: none"> <li>• Students are trained to assess a crime scene to determine causality and responsible parties.</li> <li>• Students will learn the technical writing skills associated with public administration communications</li> </ul>	<ul style="list-style-type: none"> <li>• Trident offers a certificate; the proposed emphasis would result in a bachelor of Science degree in Chemistry</li> <li>• Trident's program is housed in the Department of Criminal Justice; the proposed emphasis would be a Chemistry program in both administration and focus</li> </ul>

### Description of the Program

Projected New Enrollment						
Year	Fall		Spring		Summer <sup>1</sup>	
	Headcount	Credit Hours	Headcount	Credit Hours	Headcount	Credit Hours
2017	2	30	2	34	0	0
2018	4	60	4	62	0	0
2019	6	94	6	88	0	0
2020	8	126	8	114	0	0
2021	8	126	8	114	0	0

### Curriculum

Attach a curriculum sheet identifying the courses required for the program.

### Curriculum Changes

**Note: Complete this table only if there are changes to the curriculum.**

Courses Eliminated from Program	Courses Added to Program
PHYS 202: Introduction to Physics II This course focuses on electricity and magnetism	CHEM 101 Introduction to Criminalistics and Forensic Science  This is a new course that focuses on evidence collection and analysis
CHEM 402: Physical Chemistry II  This course focuses on Quantum Mechanics. It is unlikely that students need to apply knowledge in this area beyond what is covered in other courses in their forensic careers.	CHEM 250 Microscopical Methods  This is a new course that focuses on trace evidence analysis, with emphasis on preventing degradation of the sample due to storage or analysis
The number of required chemistry electives was reduced from three to two. Students will be required to complete forensic chemistry courses in lieu of a chemistry elective.	CHEM 360 Toxicology  This is a new course that focuses on how xenobiotic compounds interact with biological systems
	BIOL 312 Genetics  Since forensic professionals may need to work with biological samples to determine paternity or genetic characteristics, students will need to understand more about how DNA functions. This course is already offered at Lander University.
	Potential Electives are expanded to include: <ul style="list-style-type: none"> <li>• POLS 313 Judicial Processes</li> <li>• POLS 317 Introduction to Public Administration</li> <li>• BIOL 412 Genetics Research</li> </ul> These courses are already available at Lander.

<sup>1</sup> Forensic Science courses will not be taught during the summer since they will be low-enrollment courses but students who expect to earn the Forensic Science emphasis will be able to take other required courses in the summer.

## Faculty

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

There will be no new faculty required to begin this program.

Mr. Jeffrey Hollifield has been on staff with the Department of Physical Sciences as an instructor since 2011. His graduate work in chemical microscopy has enriched and expanded the breadth of the expertise in the department; we look forward to sharing this in a more direct way with students when he can begin teaching courses that are specific to his training area. Mr. Hollifield's experience in forensics spans nearly 30 years. He worked as a criminalist with the South Carolina Crime Laboratory at the State Law Enforcement Division (SLED) for more than 10 years; he currently owns his own forensic analysis firm. These achievements qualify him to teach the introductory criminalistics course and the microscopical methods. Dr. Diana Delach, who will teach the toxicology course, earned her Ph.D. in Environmental Toxicology. Both faculty members will plan to expand their current teaching responsibilities to include the proposed courses. The new biology requirement (Genetics) is already offered at the university, and has a capacity that it can accept additional students into existing sections offered at Lander University without putting additional stress on the faculty or resources.

## Resources

Identify any new library/learning resources, new instructional equipment, and new facilities or modifications to existing facilities needed to support the modified program. (2000 characters)

The Larry A. Jackson Library has been dedicating their College of Science and Mathematics resources to expanding the toxicology holdings over the past two years. Many forensic resources are already among the holdings. This includes film and text resources that cover forensic science, DNA analysis, psychology, and others. For example, the Elton B. Stephens Co. (EBSCO) e-books database allows access to a number of e-texts with publication dates as recent as 2015. This will allow our students access to up-to-date information without even walking across campus to the library.

Access to databases such as Academic Search Complete, Applied Science and Technology Full Text, and PubMed have already been supporting learning across campus; their efficacy can now be expanded to include this new degree emphasis. The Library may consider gaining access to journals such as the Journal of Forensic Science and The Microscope. New purchases will be focused on obtaining resources for microscopy and criminalistics. Books for the library to purchase might include Handbook of Forensic Science Edited by Richard Saferstein; Criminalistics. An Introduction to Forensic Science by Richard Saferstein; Polarized Light Microscopy by McCrone, McCrone, and Delly; Handbook of Chemical Microscopy, Volume II by Emile Chamot and Clyde Mason; The Particle Atlas, Volume I (Principles and Techniques) by Walter McCrone and John Delly; and The Microscopical Characters of Artificial Inorganic Solid Substances by Winchell and Winchell.

**Financial Support**

<b>Estimated New Costs by Year</b>						
<b>Category</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>Total</b>
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	7,000	7,000	0	0	14,000
Facilities	0	0	0	0	0	0
Supplies and Materials	0	600	200	100	100	1,000
Library Resources	300	300	200	100	100	1,000
Other*	0	0	0	0	0	0
<b>Total</b>	<b>21,300</b>	<b>28,900</b>	<b>29,400</b>	<b>22,200</b>	<b>23,200</b>	<b>125,000</b>
<b>Sources of Financing</b>						
<b>Category</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>Total</b>
Tuition Funding	21,504	43,008	64,512	86,016	86,016	301,056
Program-Specific Fees	0	180	180	180	180	720
State Funding (i.e., Special State Appropriation)*	0	0	0	0	0	0
Reallocation of Existing Funds*	0	10,000	10,000	0	0	20,000
Federal Funding*	0	0	0	0	0	0
Other Funding*	0	0	0	0	0	0
<b>Total</b>	<b>21,504</b>	<b>53,188</b>	<b>74,692</b>	<b>86,196</b>	<b>86,196</b>	<b>321,776</b>
<b>Net Total (i.e., Sources of Financing Minus Estimated New Costs)</b>	<b>204</b>	<b>24,288</b>	<b>45,292</b>	<b>63,996</b>	<b>62,996</b>	<b>196,776</b>

\*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.**

#### Costs:

In order to offer a microscopy course, it is essential that we purchase polarized light microscopes. These are different from traditional light microscopes, in that they allow for chemical data to be gathered. For example, analysis of fibers on traditional microscopes will allow the user to determine the color and the thickness of the fiber. Fiber analysis on the polarized light microscope we intend to purchase allows for determination of the chemicals that make up the fiber (such as nylon and cellulose, among others). This would expand the instrumentation at Lander University – instrumentation that can be used by other majors. Geology courses and research may use them for mineralogy analysis. Biology can use these new microscopes for phase contrast analysis of samples, among other applications. The associated cost can be spread across multiple years. Our intent is that this course will be a small one that allows students ample instrument time. We also do not intend to purchase more microscopes than necessary, so this will restrict the initial course enrollment.

Students in the microscopy class will require reagents to analyze. The cost in the first few years is high and then reduces because the initial stock should last a long time – in many cases, only a single grain of reagent is necessary, so a single bottle could supply courses for ten years. We plan to begin offering the course in Spring 2018, so we can delay our purchases until we already have students enrolled in the program. This will ensure we are not overspending our budget. The criminalistics and toxicology courses will not have associated laboratories, so they will not contribute to these supply costs.

The costs associated with obtaining new library resources is already factored into the Library's budget. Increasing the forensic offerings on campus aligns with our new president's signature programs, and the Library has already prepared to begin purchasing resources for those programs.

The faculty costs were determined based upon the new course offerings. Three new courses, will result in an additional one-half course load; the costs in the budget sheet reflect half the cost of a faculty member.

#### Sources of Funding:

A laboratory fee is customary for courses that require students to use reagents and analytes. A \$30 laboratory fee for the students taking the microscopy course has been incorporated into the budget sheet. We also plan to reallocate some of the department's funding for new instrumentation. Typically this funding is directed towards new faculty members and coursework, so this reallocation is exactly what the money is intended for.

As the program attracts new students to the forensics emphasis, we anticipate an increase in tuition funding. The tuition projections were determined using the projected enrollment table (page 5 of this proposal) and the current tuition at Lander University (\$10,752).

### Evaluation and Assessment

Will any of the proposed modification impact the way the program is evaluated and assessed?

- Yes  
 No

If yes, explain. (1000 characters)

This will not substantially change the assessment of the chemistry program; rather this would be a small expansion of the assessment.

Students provide data for assessment when they participate in the PSCI 499 course through the completion of a new proposal project, where they investigate a new question in their field of interest, and propose a way to go about answering this question. This allows us to assess student mastery of the material in the major and to evaluate their communication skills (via written and oral components of the project). The addition of this emphasis would not change the format of the assessment, but it would likely broaden the scope from the industrial and academic applications of chemistry we traditionally see our students pursue to include applications in criminalistics.

Will the proposed modification affect or result in program-specific accreditation?

- Yes  
 No

If yes, explain; if the modification will result in the program seeking program-specific accreditation, provide the institution's plans to seek accreditation, including the expected timeline for accreditation. (500 characters)

We plan to pursue accreditation by the Forensic Science Education Programs Accreditation Commission (FEPAC). Programs that have pursued undergraduate program accreditation by this body include SUNY Albany, Loyola University at Chicago, Ole Miss, Penn State, Texas A&M universities; there are no South Carolina colleges that possess accredited programs. We would pursue this accreditation once all of the coursework has been established at the university. Lander would be eligible for accreditation from FEPAC so long as we maintain our accreditation with SACSCOC.

Will the proposed modification affect or lead to licensure or certification?

- Yes  
 No

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

### Teacher or School Professional Preparation Programs

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

- Yes  
 No

If yes, complete the following components.

Area of Certification

Not applicable

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